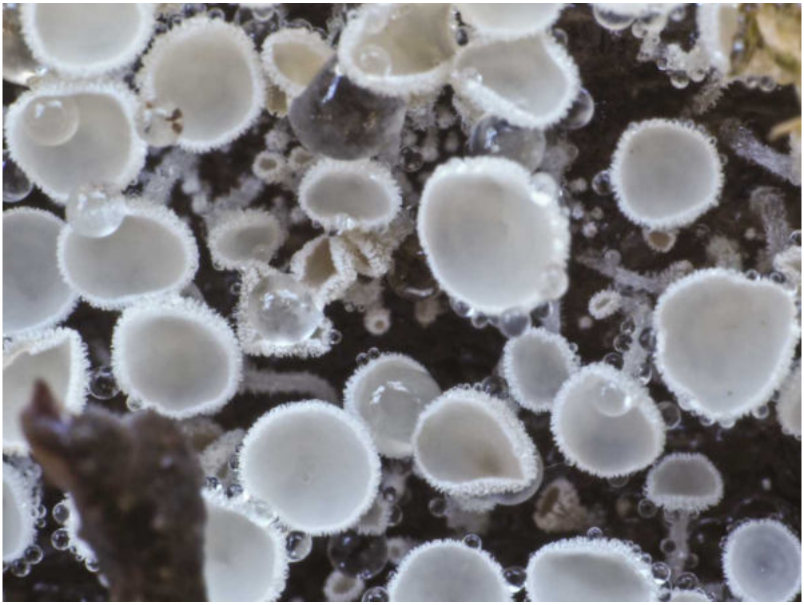
FUNGI IN AUSTRALIA

J. Hubregtse

Part 2

Ascomycota

Pezizomycotina



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Lachnum virgineum

Est. 1880

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Ascomycota

Pezizomycotina

Revision 2.2

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CHAPTER 1

PEZIZOMYCOTINA

All of the fungi described in this volume are from the subphylum Pezizomycotina.

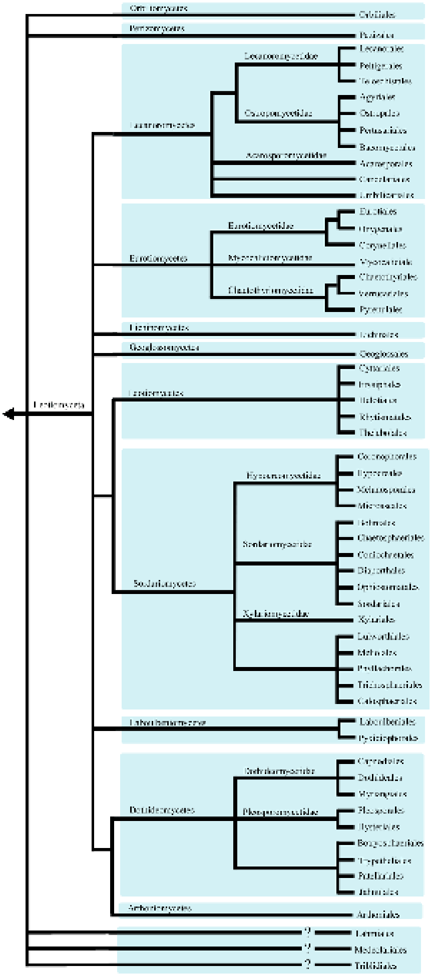

Figure 1.1: Subphylum Pezizomycotina

Recently this subphylum has undergone extensive revision, mainly in response to molecular phylogenetic research. The current status of Pezizomycontina can be seen in Figure 1.1. Its 63,000 described species are in 11 classes, 11 subclasses and 57 orders.

Before molecular phylogenetics, the classification of Pezizomycotina (= Ascomycetes sensu Kirk *et al.* 2001, = Euascomycetes sensu Alexopoulos *et al.* 1996) was based largely on fruit-body morphology and the development of the asci. The four main fruit-body morphologies are: apothecium (pl. apothecia), cleistothecium (pl. cleistothecia), perithecium (pl. perithecia), and pseudothecium (pl. pseudothecia) (Alexopoulos *et al.* 1996, Figure 1.2).

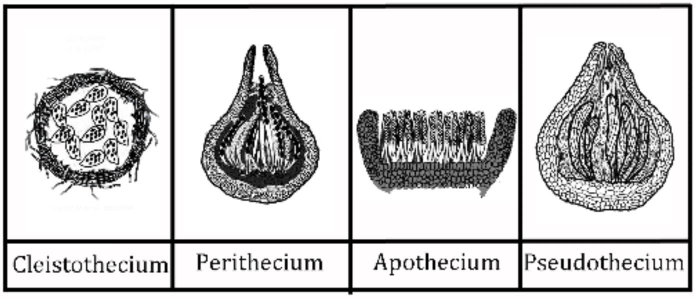

Figure 1.2: Pezizomycotina:- fruit-body types

Apothecia are typically disc-shaped to cup-shaped and produce asci on a hymenial layer exposed to the environment. Apothecial fruit-bodies can be found in the following classes: Orbiliomycetes, Pezizomycetes, Leotiomycetes, Lecanoromycetes, and Lichinomycetes. **Cleistothecia** usually have spherical fruit-bodies that normally completely enclose the asci, and the spores are released when the fruit-body ruptures. Cleistothecial fruit-bodies can be found in most of the classes in Pezizomycotina. **Perithecia** are typically flask-shaped fruit-bodies, usually with a opening (ostiole) at the top for spores to escape, and at the base of the fruit-body there is a distinct hymenial layer on which the asci and paraphyses form. Perithecial fruit-bodies can be found in the following classes: Sordariomycetes, Dothideomycetes, Laboulbeniomycetes, Geoglossomycetes, and Eurotiomycetes. **Pseudothecia** resemble perithecia but the difference is that the asci do not form on a distinct hymenial layer.

Pseudothecial fruit-bodies can be found in many of the same classes that have perithecial fruit-bodies.

The advent of molecular phylogenetics has clearly highlighted the fact that certain morphologies, such as those described above, were derived many times and were the product of convergent evolution. As a result, classification by morphology has now been largely replaced by molecular phylogenetic classification. Consequently the classification of Pezizomycotina has been revised (Spatafora *et al.* 2006, Hibbett *et al.* 2007).

This subphylum is still subject to change as there are a number of classes which are undersampled. As the sampling of species is increased, the finer structure of the subphylum will become more apparent. Most of the changes that will occur will most likely be at the order level and below.

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CHAPTER 2

SPECIES DESCRIPTIONS – PEZIZOMYCOTINA

2.1 Order: Cyttariales

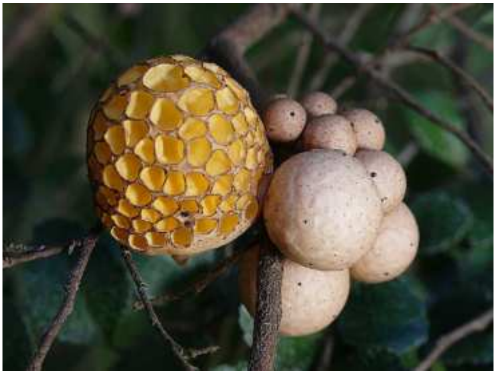
Cyttariales is an order of the class Leotiomycetes, and has only 1 family, Cyttariaceae, 1 genus *Cyttaria* and 11 described species. (Peterson *et al.* 2010a; Lumbsch and Huhndorf 2010). Fruit-bodies are apothecial and the hymenial layer is lined with eight-spored inoperculate asci. A typical mature fruit-body resembles a yellow to orange pitted golf ball. Each fruit-body is actually composed of sterile fungal tissue, in which apothecia are immersed.

Cyttariales
Taxonomic Classification

Kingdom:	Fungi
Phylum:	Ascomycota
Subphylum:	Pezizomycotina
Class:	Leotiomycetes
Order:	Cyttariales

Families
Cyttariaceae

Species are obligate parasites of *Nothofagus* spp., therefore they are restricted to the southern hemisphere, inhabiting southern South America (Argentina and Chile), south-eastern Australia (including Tasmania) and New Zealand (Peterson *et al.* 2010b). In south-eastern Australia the species *Cyttaria gunnii* (Beech Orange) is parasitic on Myrtle Beech *Nothofagus cunninghamii*, which is largely restricted to Victoria and Tasmania.



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Cyttaria gunnii

Another species found in Australia is *Cyttaria septentrionalis*, which occurs on Antarctic Beech *Nothofagus moorei*, much further north than *Cyttaria gunnii*, in northern New South Wales and southern Queensland. Molecular sequence data have failed to resolve *Cyttaria septentrionalis* as a species separate from *Cyttaria gunnii*. At present the two species are maintained based on morphological differences and the fact that each occurs on a different host (Peterson *et al.* 2010a).

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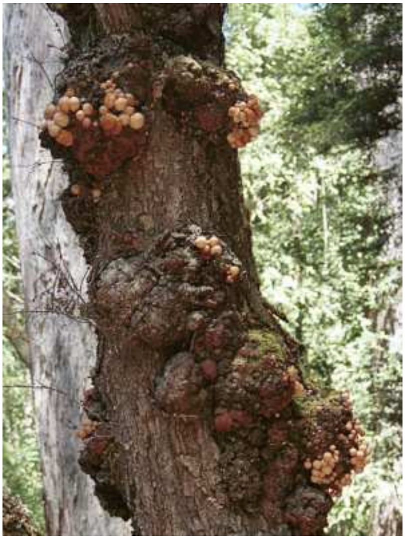
Fam. Cyttariaceae

Cyttaria gunnii



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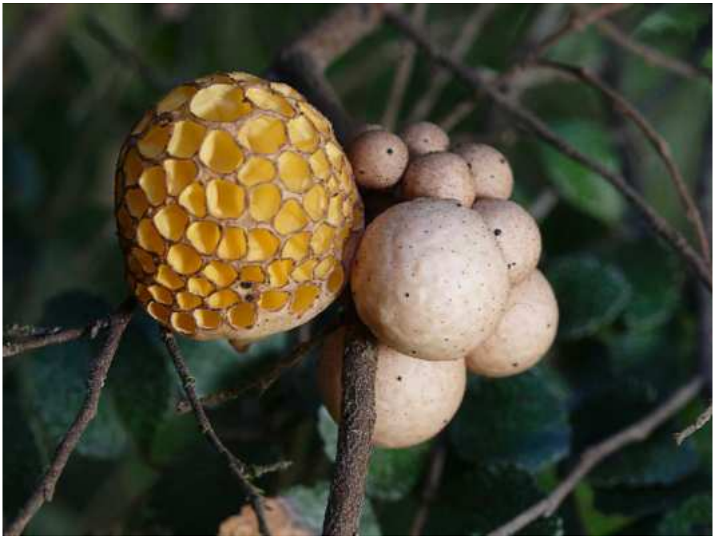

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Fam. Cyttariaceae

Cyttaria gunnii

Cyttaria septentrionalis

Biology

Parasitic ascomycete; obligate parasite on Myrtle Beech *Nothofagus cunninghamii* and Antarctic Beech *N. moorei*; causes the formation of woody galls, on which gregarious or caespitose clusters of fruit-bodies form.

Fruit-body Description

Diameter to 30 mm; globose to pear-shaped; when young smooth, dry, fawn to tan; when mature bright yellow; surface covered in deep pits (apothecia); sterile base remains white; fruit-body largely hollow, texture soft. **Apothecia** numerous, up to 0.8 mm across, bright yellow to orange. **Spore Print** Black

Microscopic Features

Ascospores 12–15 × 12–13.5 μm, smooth, sub-globose. Asci 145–165 × 13–14 μm. Paraphyses same length as asci, 2 μm wide, septate, branched, swollen at apex.

Comments

Cyttaria gunnii is easily recognised in the field: the bright yellow globose to pear-shaped fruit-bodies are unmistakable. In Australasia it appears only on *Nothofagus cunninghamii* or *N. moorei*, usually in late spring to early summer, where it fruits annually on perennial galls. The infestation is usually not harmful to the tree since the mycelium does not travel any great distance in the host; consequently only local malformations are produced. However, a bad infestation can kill the tree.

References

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Grey P and Grey E (2005) *Fungi down under: the Fungimap guide to Australian fungi.* Fungimap: South Yarra, Victoria. **p. 103** **[D CP]**

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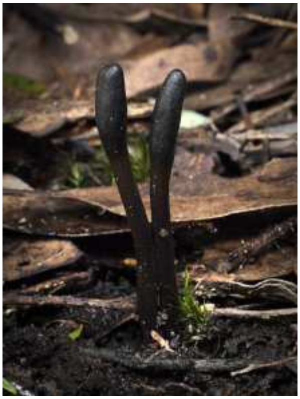
2.2 Order: Geoglossales

Geoglossales is an order in the recently created class Geoglossomycetes (Schochet *et al.* 2009) and currently comprises 1 family (Geoglossaceae) with 6 genera (Hustad *et al.* 2013). Recent phylogenetic analysis by Hustad *et al.* (2013) puts the genera *Geoglossum*, *Glutinoglossum*, *Nothomitra*, *Sabuloglossum*, *Sarcoleotia* and *Trichoglossum* into the family Geoglossaceae, while Species Fungorum (http://www.speciesfungorum.org) does not recognise *Nothomitra* but still has *Microglossum* in Geoglossaceae.

Geoglossales
Taxonomic Classification

Kingdom:	Fungi
Phylum:	Ascomycota
Subphylum:	Pezizomycotina
Class:	Geoglossomycetes
Order:	Geoglossales

Families
Geoglossaceae



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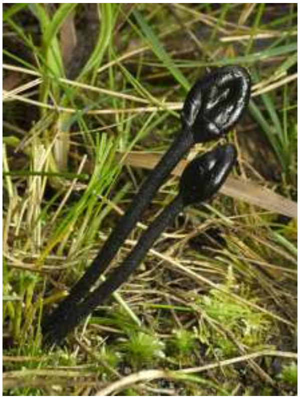
Glutinoglossum glutinosum



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Trichoglossum hirsutum

The Geoglossales can be found on every continent except Antarctica and are common in many temperate and tropical habitats. They are a fairly small group of terrestrial, apothecial, dark, club-shaped fruit-bodies, where the hymenial layer is lined with eight-spored inoperculate asci. Typically the ascospores are fusiform and multiseptate, and range in colour from dark brown or black (*Geoglossum*, *Glutinoglossum* and *Trichoglossum*), to light-coloured or hyaline (*Nothomitra*, *Sarcoleotia* and *Sabuloglossum*). The fertile hymenium originates at the apex of the fruit-body. In *Geoglossum*, *Glutinoglossum* and *Trichoglossum* the hymenium intergrades with a sterile stipe, while in

Nothomitra, *Sarcoleotia* and *Sabuloglossum* the hymenium terminates abruptly at a sterile stipe.

Identification of species is frequently compromised by a lack of appreciation that spore pigmentation and septation may not develop until the fruit-bodies are quite mature, and many morphological characteristics that may be used to separate species can be ambiguous. It is evident from recent work that the content of the order Geoglossales is not fully resolved and more work is required.

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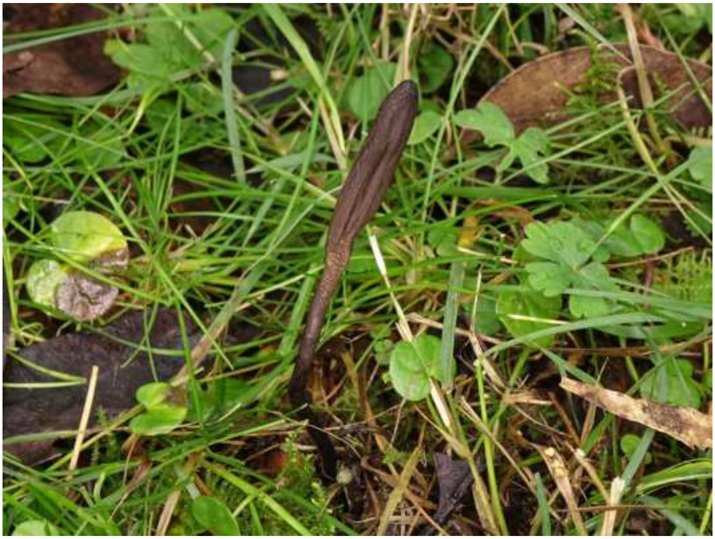
Fam. Geoglossaceae

Geoglossum umbratile



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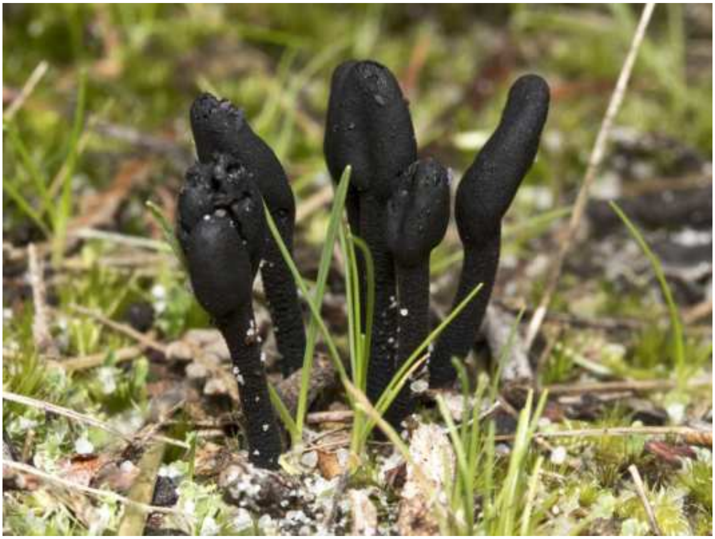

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Fam. Geoglossaceae

Geoglossum umbratile

Biology

Saprotrophic ascomycete; often found in small groups or solitary, on soil, in humus, or moss.

Fruit-body Description

Up to 80 mm tall, divided into stalk (stipe) and upper fertile portion (hymenium), black or blackish brown. **Hymenium** up to one-third of the height of the fruit-body, occasionally up to 7 mm wide, and 4 mm thick, smooth, may be cylindric, clavate or flabelliform (fan-shaped), often longitudinally furrowed, colour black or blackish brown. **Stipe** up to 2 mm thick, cylindric, surface usually finely squamulose in the upper part, becoming glabrous towards the base, colour usually slightly paler than hymenium. **Spore Print** Black

Microscopic Features

Ascospores 65–77.5 × 4.5–6 μm, cylindric, straight or slightly curved, slightly acute at one end, 7 septate. Asci 175–200 × 15–19 μm, eight-spored; narrowly cylindric-clavate, tapered towards the apex and below to a narrow stipe. Paraphyses filiform, septate, apex usually curved or coiled to hooked, the terminal cell abruptly enlarged to 4–10 μm in diameter.

Comments

There may be up 10 or more species of earth-tongues in Australia. Their morphologies overlap and most of them are coloured black to blackish brown. Therefore, microscopic examination is required for species level identification.

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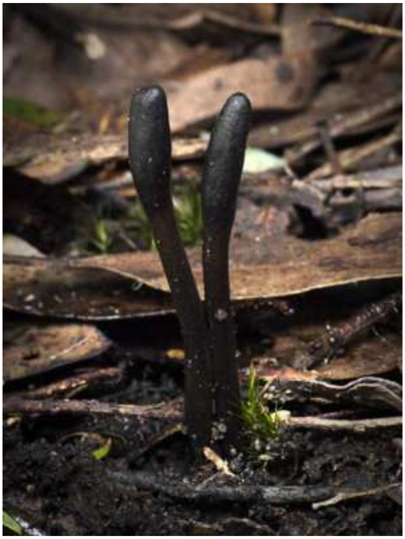
Fam. Geoglossaceae

Glutinoglossum australasicum



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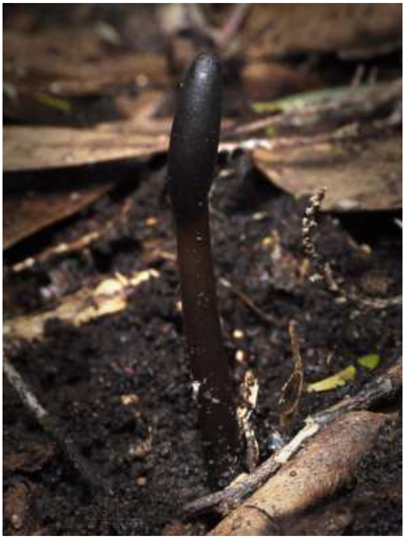

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Fam. Geoglossaceae

Glutinoglossum australasicum

Geoglossum glutinosum *Glutinoglossum glutinosum*

Biology

Saprotrophic ascomycete; often found in small groups or solitary in humus, moss, or occasionally on well rotted wood.

Fruit-body Description

Up to 50 mm tall, divided into stalk (stipe) and upper fertile portion (hymenium), entire fruit-body viscid-glutinous when moist. **Hymenium** up to a third of the height of the fruit-body, up to 4 mm thick at broadest point, tongue-shaped to clavate, may be flattened; surface smooth, black. **Stipe** up to 33 mm long and up to 2 mm thick, surface smooth and slightly paler than hymenium. **Flesh** tough, not glutinous. **Spore Print** Black

Microscopic Features

Ascospores 80–92 × 4–5 μm, cylindric, straight or slightly curved, 3 to 7 septate. Asci 200–270 × 17–19 μm, eight-spored; narrowly cylindric-clavate, tapered towards the apex and below to a narrow stipe. Paraphyses filiform, sparsely septate, enlarged at apex 3.5–6.5 μm, diameter.

Comments

Glutinoglossum australasicum species are not readily separated from other black earth-tongues by their glutinous/viscid fruit-bodies alone. DNA evidence has separated this species from other species in the genus and it is by far the most common *Glutinoglossum* species in Australia (Hastad and Miller 2015). However, it still requires microscopic examination for species level identification.

References

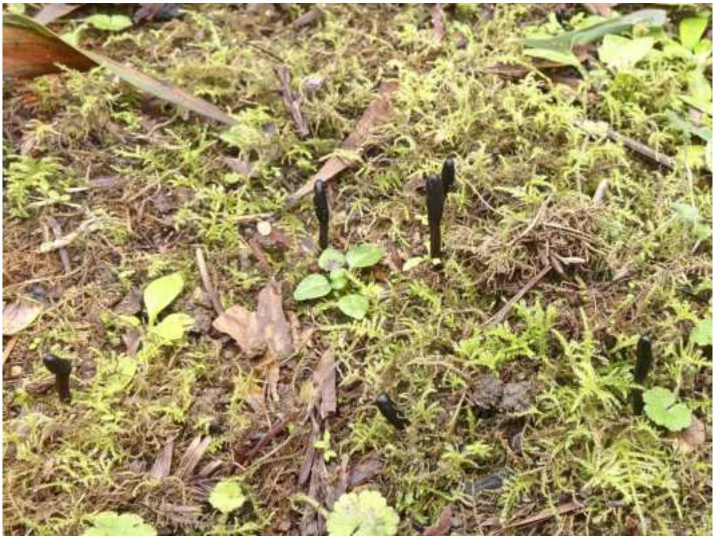
Dennis RWG (1978) *British Ascomycetes*. Strauss &Cramer: GmbH, 6945 Hirschberg. **p. 95** **[D]** (as *Geoglossum glutinosum*)

Hustad VP and Miller AN (2015) “Studies in the genus *Glutinoglossum*”. *Mycologia* **Vol. 107(3) pp. 647–657** **[D CP]**

Spooner BM (1987) “Helotiales of Australasia: Geoglossaceae, Orbiliaceae, Sclerotiniaceae, Hyaloscyphaceae”. *Bibliotheca Mycologica* **Vol. 116, pp. 107–112** **[D I]** (as *Geoglossum glutinosum*)

Fam. Geoglossaceae

Glutinoglossum methvenii



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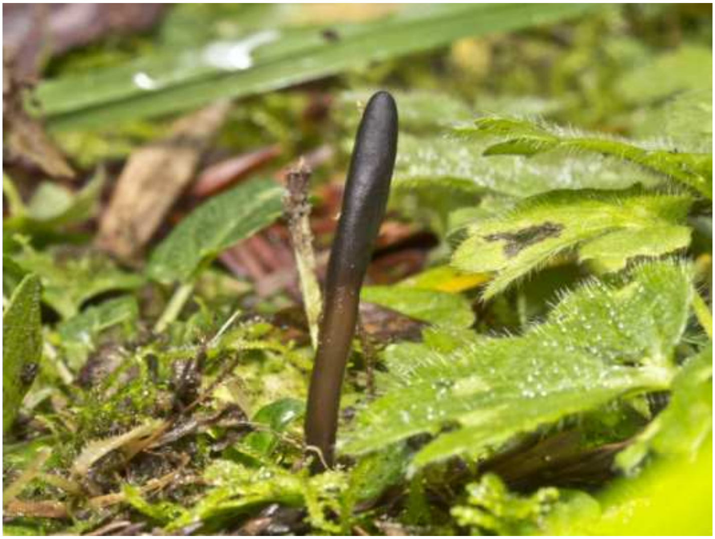

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Fam. Geoglossaceae

Glutinoglossum methvenii

Biology

Saprotrophic ascomycete; often found in small groups or solitary in humus, moss, or occasionally on well rotted wood.

Fruit-body Description

Up to 45 mm tall, divided into stalk (stipe) and upper fertile portion (hymenium), entire fruit-body viscid-glutinous when moist. **Hymenium** one-quarter to one-third of the height of the fruit-body, 3 to 5 mm thick at broadest point, clavate to spathulate, may be laterally flattened; surface smooth, black. **Stipe** up to 2 mm thick, surface smooth and slightly paler than the hymenium. **Flesh** tough, not glutinous. **Spore Print** Black

Microscopic Features

Ascospores 69–76 × 5–6 μm, cylindric-clavate, straight or slightly curved, initially hyaline but brown when mature, majority 3 septate but some up to 7 septate. Asci 227–260 × 16–17 μm, eight-spored; narrowly cylindric-clavate, tapered towards the apex and below to a long narrow base approximately 50% of the ascus length. Paraphyses filiform, sparsely septate, occasionally curved to slightly hooked at the apex; enlarged at apex, 3.5–8 μm diameter.

Comments

In the field *Glutinoglossum methvenii* is not readily separated from other *Glutinoglossum* species. In Australia this species has been misidentified as a variant of *Geoglossum glutinosum*. With the aid of DNA evidence this species has been separated from *G. glutinosum* and can be readily identified by microscopic characteristics, such as by the ascospore size, with predominantly 3 septa, and paraphyses with curved and inflated tips. DNA evidence has also shown that morphologically similar *Glutinoglossum* species from the northern and southern hemispheres are different species (Hustad and Miller 2015).

References

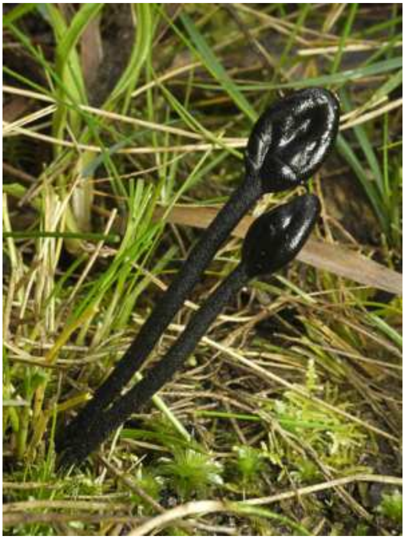
Hustad VP and Miller AN (2015) "Studies in the genus *Glutinoglossum*". *Mycologia* **Vol. 107(3) pp. 647–657** **[D CP]**

Spooner BM (1987) "Helotiales of Australasia: Geoglossaceae, Orbiliaceae, Sclerotiniaceae, Hyaloscyphaceae". *Bibliotheca Mycologica* **Vol. 116, pp. 107–112** **[D I]** (as *Geoglossum glutinosum*)

D=Description; **I**=Illustration; **CI**=Colour Illustration; **P**=Photo; **CP**=Colour Photo

Fam. Geoglossaceae

Trichoglossum hirsutum



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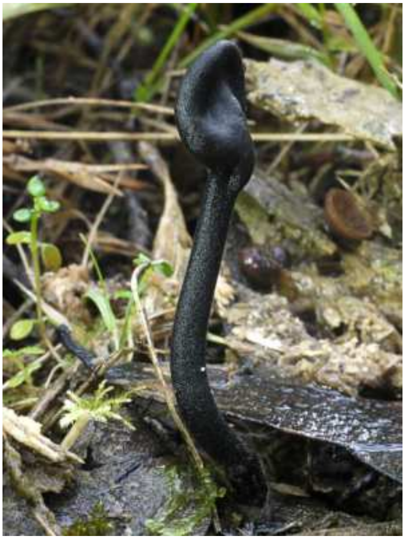

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Fam. Geoglossaceae

Trichoglossum hirsutum

Biology

Saprotrophic ascomycete; found on the ground, often in small groups amongst grass, leaf litter, or rarely on rotten wood.

Fruit-body Description

Up to 100 mm tall, club-shaped, divided into stalk (stipe) and an upper fertile head (hymenium). **Fertile head** can be up to half the height of the fruit-body, tongue-shaped to clavate, may be flattened, twisted, or furrowed; surface setose (with short spiny hairs); colour black to blackish brown. **Stipe** up to 60 mm tall and 3 mm thick, tapering towards the base; surface densely setose, rough; colour dark brown to black. **Flesh** tough, not glutinous. **Spore Print** Black

Microscopic Features

Ascospores 123–165 × 6–6.5 μm, cylindric, straight or slightly curved, ends rounded, mature spores 15 septate. Asci 220–280 × 20–26 μm, eight-spored; narrowly cylindric-clavate, narrowing below to a short stipe-like base. Paraphyses enlarged at the apex, 5–7 μm diameter, filiform and remotely septate. Setae 200–300 × 6–13 μm, abundant, non-septate, rigid, dark brown to black.

Comments

Trichoglossum hirsutum is a dark earth-tongue that has many look-alikes. *Trichoglossum* species have short bristly hairs covering their surface, whereas similar looking *Geoglossum* species have a smooth surface. The short bristly hairs are best seen with the aid of a hand lens. In Australia, an earth-tongue that is growing on the ground, is covered with tiny bristly hairs and is 60 mm or more tall, with a distinct fertile head, will probably be *T. hirsutum*, but microscopic examination is necessary to confirm this.

References

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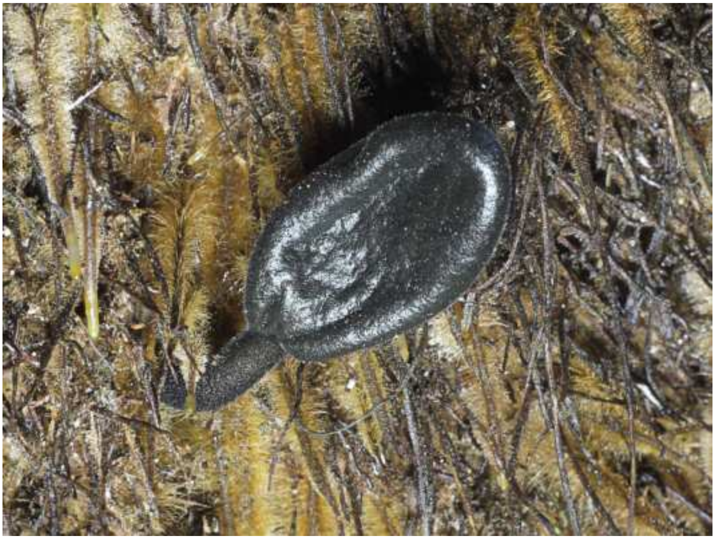
Fam. Geoglossaceae

Trichoglossum walteri



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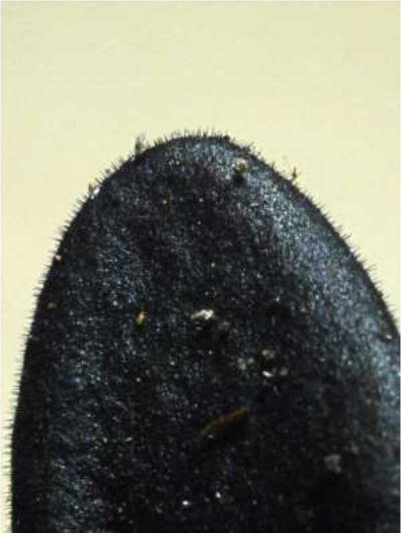

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Fam. Geoglossaceae

Trichoglossum walteri

Biology

Saprotrophic ascomycete; solitary or gregarious, on the ground amongst moss, or attached to tree fern (*Dicksonia* sp.) trunks (caudices).

Fruit-body Description

Up to 60 mm tall, club-shaped, divided into stalk (stipe) and a upper fertile head (hymenium). **Fertile head** is usually more than half the height of the fruit-body, tongue-shaped to clavate, or ellipsoidal to cylindrical, rounded at apex, flattened, twisted, or furrowed; surface setose (with short spiny hairs); colour black to blackish brown. **Stipe** up to 30 mm tall and 2 mm thick, clearly differentiated from fertile head; surface usually densely setose; colour black. **Flesh** tough, not glutinous. **Spore Print** Black

Microscopic Features

Ascospores 80–106 × 4–5 μm, cylindric, straight or slightly curved, ends rounded, mature spores 7 septate. Asci 220–260 × 16–24 μm, eight-spored; narrowly cylindric-clavate, narrowing below to a short stipe-like base. Paraphyses enlarged at the apex, 4–8 μm, diameter, filiform and remotely septate, often strongly curved or coiled. Setae 270–350 × 12–20 μm, abundant, non-septate, rigid, dark brown to black.

Comments

Trichoglossum walteri is a dark earth-tongue that has many look-alikes. *Trichoglossum* species have short bristly hairs covering their surface, whereas similar looking *Geoglossum* species have a smooth surface. The short bristly hairs are best seen with the aid of a hand lens. In Australia, an earth-tongue that has bristly hairs, is less than 60 mm tall with a distinct fertile head, and is growing on a tree fern trunk, is likely to be *T. walteri*, but microscopic examination is required to confirm this.

References

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2.3 Order: Helotiales

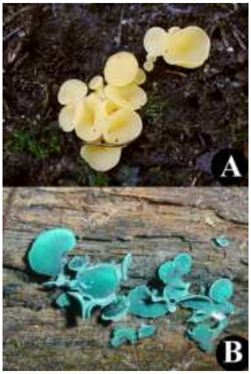
Helotiales is an order of the class Leotiomycetes and is estimated to contain 10 families, 501 genera, and 3881 species (Kirk *et al.* 2008). Helotiales have apothecial fruit-bodies that have a hymenial layer lined with eight-spored inoperculate asci. Because the species within this order have highly divergent characters of morphology, ecology and biology, it is one of the most difficult groups for traditional classification and molecular phylogeny. The molecular data for this order are inadequate because of the small number of species that have been sampled, and as a result the taxonomy of this order is still unsettled.

Most Helotiales live saprobically on soil, humus, dead wood, manure and other organic matter, and many have disc- or cup-shaped fruit-bodies. Some species are parasitic on plants and some can cause significant harm, for example by causing brown rot on stone fruits.

Helotiales
Taxonomic Classification

Kingdom:	Fungi
Phylum:	Ascomycota
Subphylum:	Pezizomycotina
Class:	Leotiomycetes
Order:	Helotiales

Families
Ascocorticiaceae
Dermateaceae
Helotiaceae
Hemiphacidiaceae
Hyaloscyphaceae
Loramycetaceae
Phacidiaceae
Rutstroemiaceae
Sclerotinaceae
Vibrisseaceae



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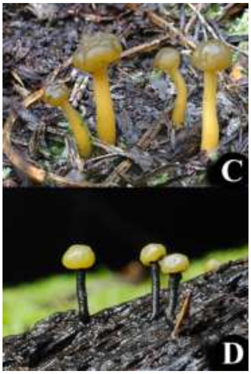
A. *Bisporella citrina*
B. *Chlorociboria aeruginascens*



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C. *Leotia lubrica*
D. *Chlorovibrissea bicolor*

The pictures above illustrate some of the members of the Helotiales. *Bisporella citrina*, *Leotia lubrica* and *Chlorociboria aeruginascens* are common species which are globally distributed, but to date the only records for the rare species *Chlorovibrissea bicolor* are from the south-eastern region of Australia.

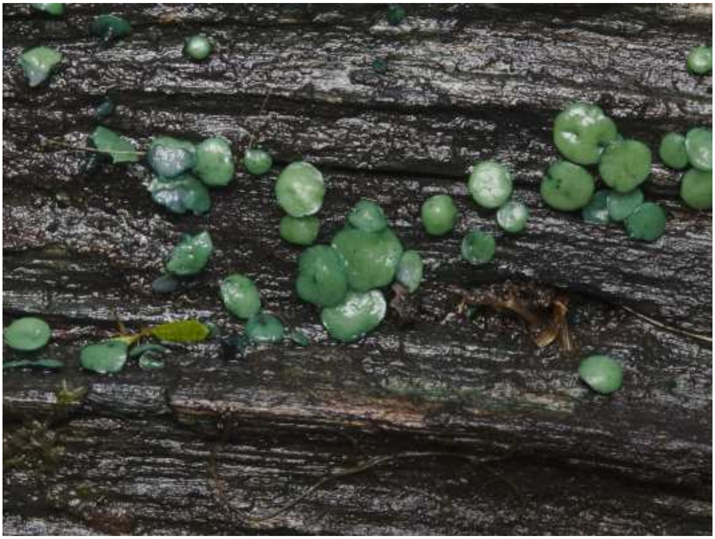
References

Kirk PM, Cannon PF, Minter DW and Stalpers JA (2008) *Ainsworth and Bisby's dictionary of the Fungi.* (10th ed.) CAB International: Wallingford (UK).

Wang Z, Binder M, Schoch CL, Johnston PR, Spatafora JW and Hibbett DS (2006) "Evolution of helotialean fungi (Leotiomycetes, Pezizomycotina): A nuclear rDNA phylogeny". *Molecular Phylogenetics and Evolution* **Vol. 41, pp. 295–312.**

Fam. Chlorociboriaceae

Chlorociboria aeruginascens complex



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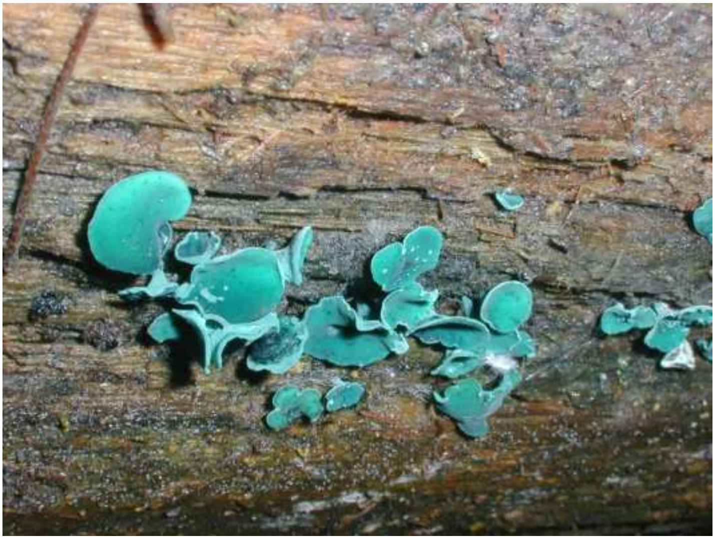

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Fam. Chlorociboriaceae

Chlorociboria aeruginascens complex

Chlorosplenium aeruginascens

Biology

Saprotrophic ascomycete; gregarious on decorticated rotting wood, which is always stained green by the fungus.

Fruit-body Description

A stalked disc-shaped fruit-body, up to 7 mm across and up to 5 mm tall; initially cup-shaped then flattening to a disc shape; margin becoming irregular with age. **Upper Surface** spore-bearing, smooth, blue-green, often developing yellowish tints with age. **Lower Surface** lighter in colour, smooth. **Stipe** normally central; up to 3 mm long and 1 mm thick; similar colour to disc. **Spore Print** White

Microscopic Features

Ascospores 6–10 × 2–3.5 μm, smooth, blunt-ended, spindle-shaped. Asci 50–70 × 4–5 μm, cylindrical or tapering towards base.

Comments

The blue-green stained wood produced by this fungus was used as a veneer inlay on furniture known as “Tunbridge ware”. At least fifteen species of *Chlorociboria* occur in New Zealand, and all of them stain wood blue-green (Johnston and Park 2005). These species are difficult to separate in the field, but it is likely that such a variety also occurs in Australia.

References

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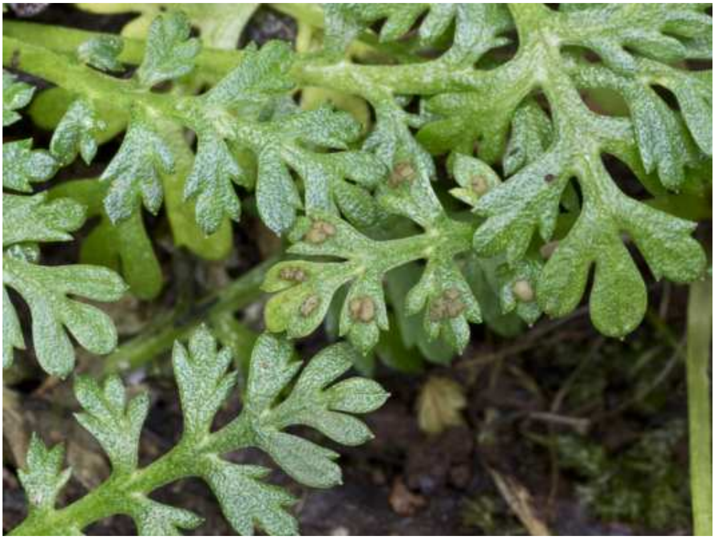
Fam. Dermateaceae

Fabraea rhytismoidea



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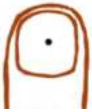

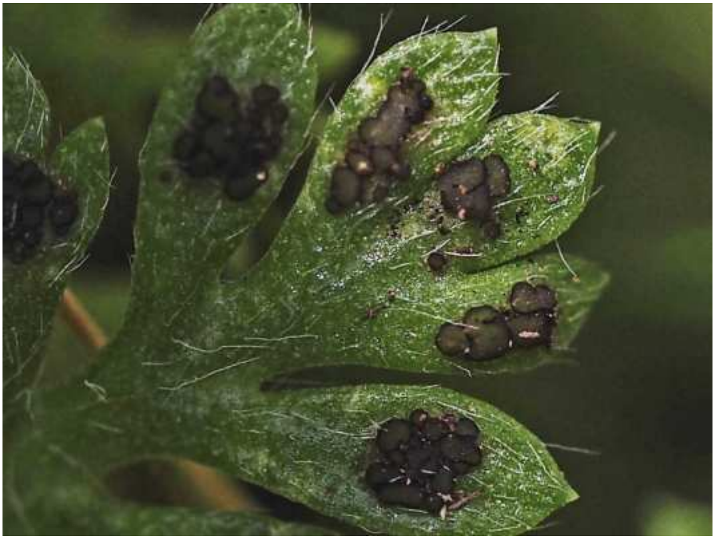

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Fam. Dermateaceae

Fabraea rhytismoidea

Biology

Parasitic ascomycete; solitary, gregarious, sometimes caespitose, usually on the upper surface of the leaves of the montane daisy *Leptinella filicula*.

Fruit-body Description

Fruit-body is a partly immersed, round, ellipsoidal or irregularly shaped disc up to 1 mm diameter, disc shallow cup-shaped; **Inner Surface** spore-bearing, smooth, whitish to pale brown with a distinctive thin dark brown margin. **Spore Print** White

Microscopic Features

Ascospores 12–19 × 4–5.5 μm, ellipsoidal-fusiform, mostly becoming 1 septate, a few becoming 3-4 septate; hyaline. Asci 63–80 × 9–11 μm, cylindrical clavate Paraphyses cylindrical 2.5 μm, thick expanding to 6 μm, at tips, slightly longer than asci.

Comments

Fabraea rhytismoidea is a small easily overlooked fungus which is parasitic on the upper surface of the leaves of the montane daisy *Leptinella filicula*. This species can be found at almost any time of year in wet conditions.

References

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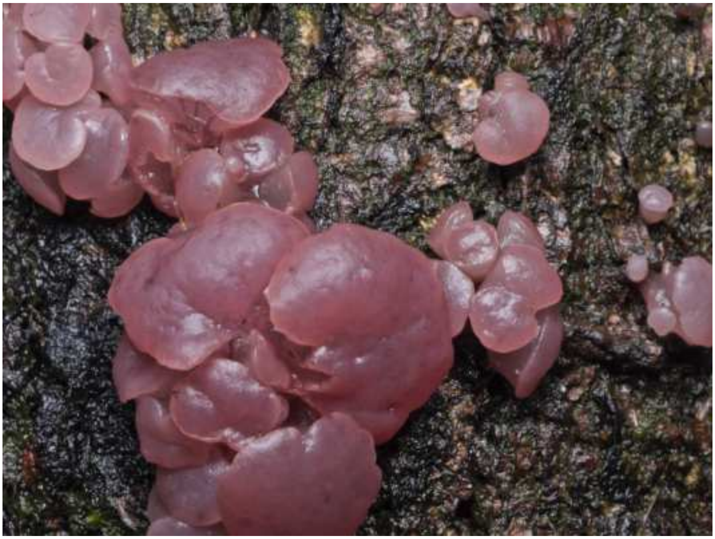
Fam. Helotiaceae

Ascocoryne sarcoides



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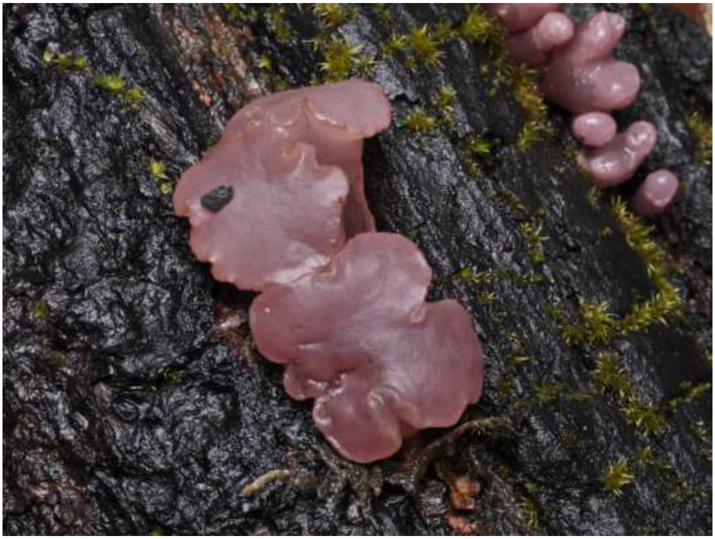

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Fam. Helotiaceae

Ascocoryne sarcoides

Biology

Saprotrophic ascomycete; gregarious on decaying wood in wet forests.

Fruit-body Description

Disc diameter up to 20 mm; margin often irregularly lobed; gelatinous; with or without a short central stipe. **Upper Surface** spore-bearing, smooth to slightly wrinkled when fully grown; pinkish to violet-pink. **Lower Surface** smooth; same colour as upper surface. **Spore Print** White

Microscopic Features

Ascospores 12–16 × 4–5 μm, ellipsoidal, smooth, with 2 oil drops, with a single septum when mature. Asci eight-spored, 114–130 × 8–10 μm.

Comments

This species comes in two forms. The common form is its sexual stage, which is disc-shaped. The other stage is its asexual (conidial) stage, which consists of club-like lobes. The colour and gelatinous nature of both stages are the same.

References

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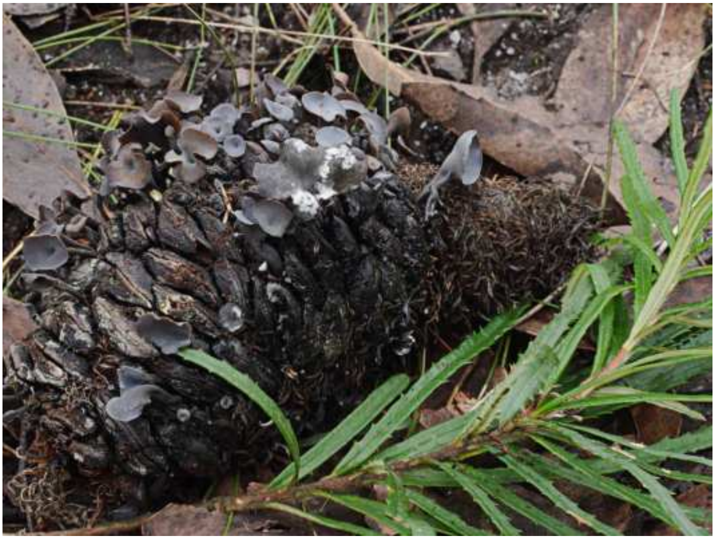
McCann IR (2003) *Australian fungi illustrated.* Macdown Productions: Vermont, Victoria. **p. 111** **[CP]**

Phillips R (2006) *Mushrooms.* Macmillan: London. **p. 371** **[D CP]**

Fam. Helotiaceae

Banksiamyces macrocarpus



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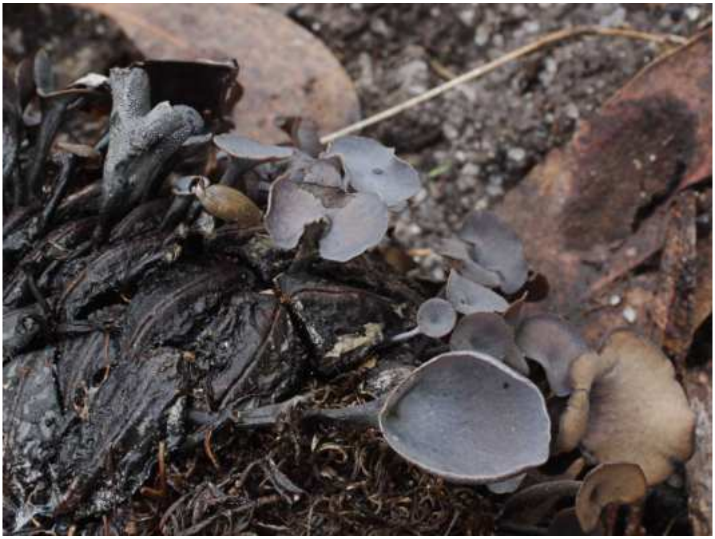

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Fam. Helotiaceae

Banksiamyces macrocarpus

Biology

Saprotrophic ascomycete; found in clusters on dead Hairpin Banksia *Banksia spinulosa* cones, on the central surfaces of the follicle valves.

Fruit-body Description

Up to 15 mm across; cup- or saucer-shaped fruit-body (apothecium) with a stipe up to 15 mm long; when fresh texture firm, tough, and leathery. **Upper Surface** spore-bearing, smooth, with a dip in the centre, dark grey. **Lower Surface** smooth, same colour as upper surface, stipe central or eccentric, tapering towards substrate. **Spore Print** White

Microscopic Features

Ascospores 4.5–7 × 1.5–3 μm, ellipsoidal, smooth. Asci eight-spored 55–65 × 4–5.5 μm, clavate. Stipe has pigmented hyphae.

Comments

Banksiamyces macrocarpus is readily recognised. It is the largest of the *Banksiamyces* species, and to date is the only *Banksiamyces* species found on dead *Banksia spinulosa* cones.

References

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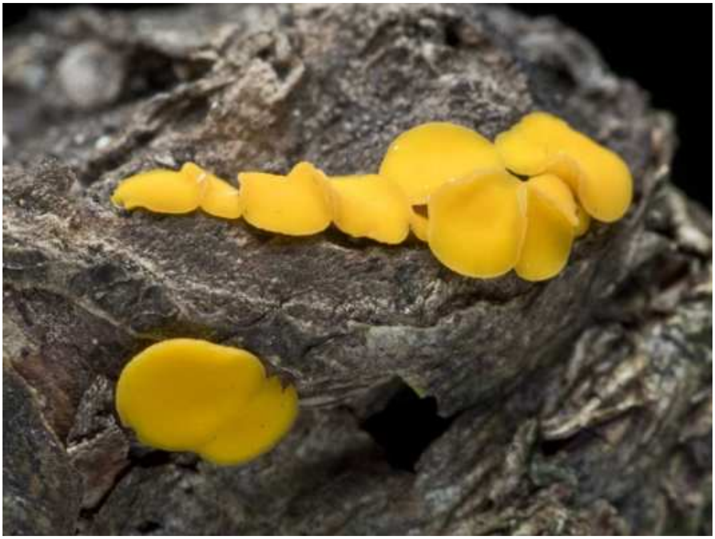
D=Description; **I**=Illustration; **CI**=Colour Illustration; **P**=Photo; **CP**=Colour Photo

Fam. Helotiaceae

Bisporella citrina



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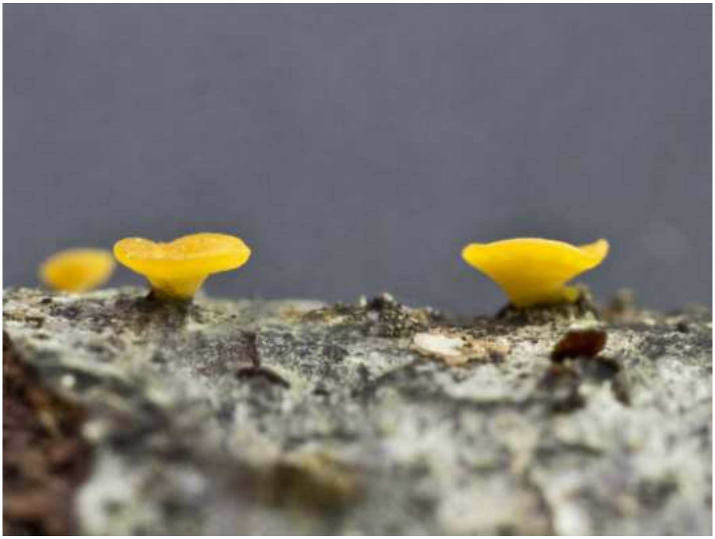

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Fam. Helotiaceae

Bisporella citrina

Biology

Saprotrophic ascomycete; usually found on decorticated dead branches; gregarious, sometimes growing in large numbers over entire branch.

Fruit-body Description

Small fruit-body up to 3 mm across, slightly convex to saucer-shaped, resting with or without a very short stipe on the substrate. **Inner Surface** spore-bearing, smooth, lemon to egg yolk yellow, often darker at the margin. **Outer Surface** smooth, same colour as inner surface. **Spore Print** White

Microscopic Features

Ascospores 8–12 × 3–5 μm, ellipsoidal, often becoming 1-septate, with 2 oil drops. Asci eight-spored, 100–130 × 7–8 μm.

Comments

Bisporella citrina, which is less than 3 mm across, is found on dead wood as well as *Banksia* cones. There are a number of similar yellow disc species of fungi, and for simplicity these are often grouped together. For identification the microscopic features need to be examined.

References

Breitenbach J and Krãnzlin F (1984) *Fungi of Switzerland* Vol. 1: Ascomycetes. Verlag Mykologia: Luzern, Switzerland. **p. 160** **[D CP]**

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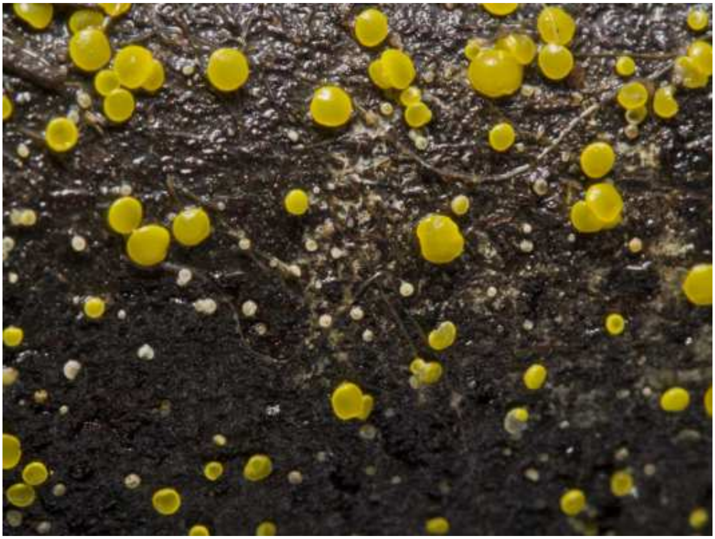
Phillips R (2006) *Mushrooms.* Macmillan: London. **p. 371** **[D CP]**

Fam. Helotiaceae

Bisporella sulfurina



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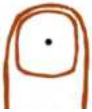

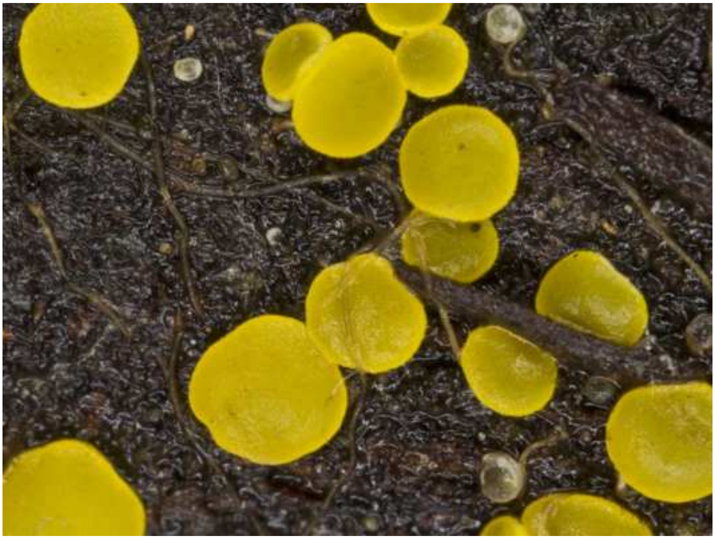

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Fam. Helotiaceae

Bisporella sulfurina

Biology

Saprotrophic / parasitic ascomycete; usually found on dead branches; solitary or gregarious, often in small dense clusters, and always associated with old fruit-bodies of fungal species belonging to the Xylariales. These old fruit-bodies appear as a black crust in close proximity to the brightly coloured discs.

Fruit-body Description

Small, up to 1.5 mm across, shallow cup- to saucer-shaped, margin even, lacking hairs, almost translucent, sessile or with a rudimentary stipe. **Inner Surface** spore-bearing, smooth, bright sulphur yellow. **Outer Surface** glabrous or minutely downy, yellow. **Spore Print** Not observed

Microscopic Features

Ascospores 8–10 × 2–2.5 μm, narrowly ellipsoidal, 1-septate at maturity, some with oil drops. Asci eight-spored, 70–100 × 7–8 μm, cylindric-clavate, pore not blued by Melzer's Reagent (inamyloid). Paraphyses filiform, with rounded tips.

Comments

Bisporella sulfurina is not rare but is easily overlooked because of its small size – usually less than 1 mm across. It can readily be identified by its small size, bright sulphur-yellow colour and the presence a black crust (old fruit-body of a species belonging to the Xylariales) nearby.

References

Breitenbach J and Krãnzlin F (1984) *Fungi of Switzerland* Vol. 1: Ascomycetes. Verlag Mykologia: Luzern, Switzerland. **p. 162** **[D CP]**

Dennis RWG (1978) *British Ascomycetes.* Strauss &Cramer: GmbH, 6945 Hirschberg. **p. 132** **[D CI]**

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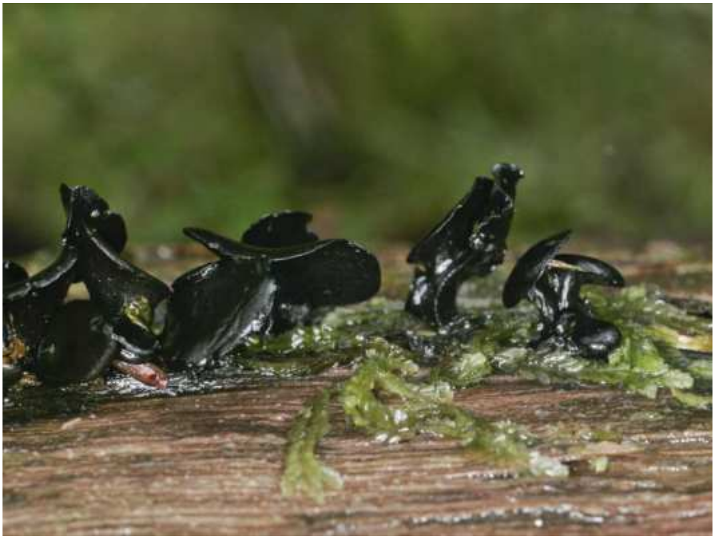
D=Description; **I**=Illustration; **CI**=Colour Illustration; **P**=Photo; **CP**=Colour Photo

Fam. Helotiaceae

Cordierites frondosa



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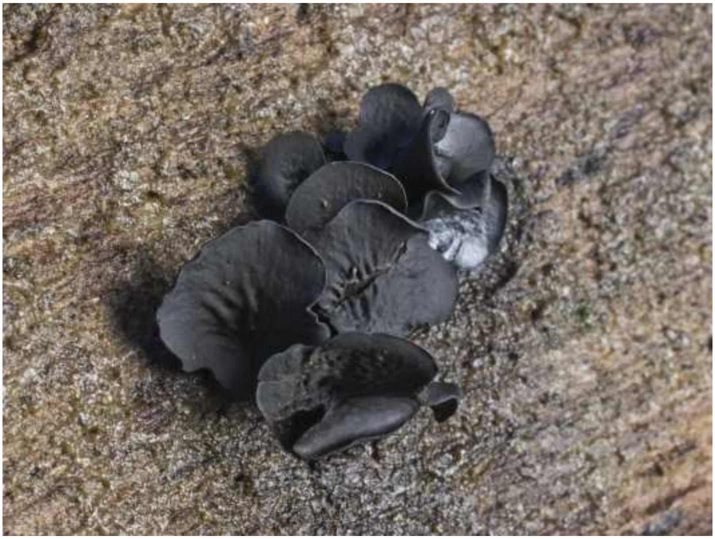

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Fam. Helotiaceae

Cordierites frondosa

Bulgaria frondosa *Ionomidotis frondosa*

Biology

Saprotrophic or possibly a parasitic ascomycete; gregarious on decorticated wood in wet forests, often growing in association with *Hypoxylon* spp. and possibly with other species in the Xylariaceae.

Fruit-body Description

Diameter up to 20 mm; initially discoid, becoming ear-shaped with age, margin often irregularly lobed; tough, gelatinous; sessile to short-stipitate, stipes arising from a common base. **Upper Surface** spore-bearing, black to nearly black, surface minutely pustulate when dry. **Lower Surface** smooth; same colour as upper surface. **Chemical test** tissue releases a purple-brown pigment in a 2–5% KOH solution. **Spore Print** Not observed

Microscopic Features

Ascospores 4.5–6 × 1–2 μm, (mean $5.1 \pm 0.4 \times 1.5 \pm 0.2$ μm, Q=3.48 ± 0.46 n=30), rod-shaped to slightly curved (allantoid). Asci eight-spored, 30–40 × 3–4.5 μm. Paraphyses filiform, straight or curved, apex 1–3 μm wide.

Comments

This species, which colonises wet rotting logs, is found in both northern and southern hemispheres. In Japan it commonly occurs on wood that has been cut for "shiitake" mushroom cultivation, which is a problem because *C. frondosa* is toxic and can cause serious poisoning if eaten (Korf 1959). *C. frondosa* is characterised by gregarious black, ear-shaped fruit-bodies, about 10–20 mm across. This is not an easy species to identify in the field, but a chemical test, where a small piece of fruit-body is placed in a KOH solution, can be used. If a purple-brown pigment is released, there is a good probability that the fungus is *C. frondosa*. It would still be advisable to follow this up with microscopic analysis.

References

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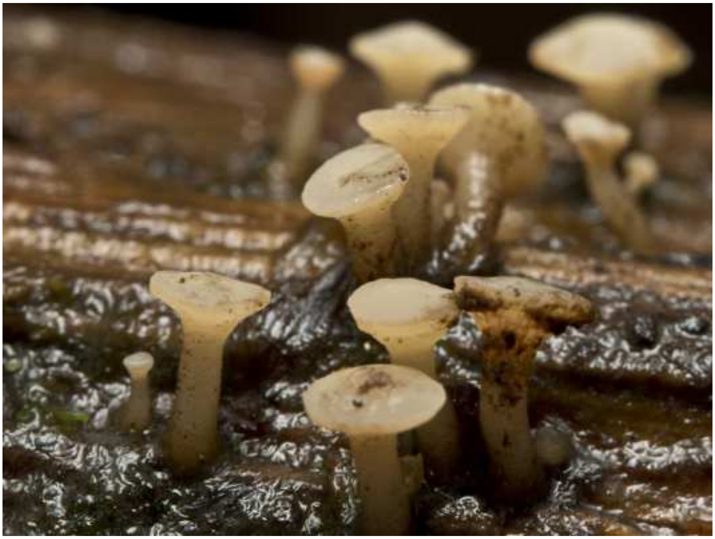
Zhuang W-Y (1988) “Studies on some discomycete genera with an ionomidotic reaction: *Ionomidotis*, *Poloniodiscus*, *Cordierites*, *Phyllomyces*, and *Ameghiniella*”. *Mycotaxon* **Vol. 31(2), pp. 261–298** **[D I]** (as *Ionomidotis frondosa*)

Fam. Helotiaceae

Cudoniella clavus



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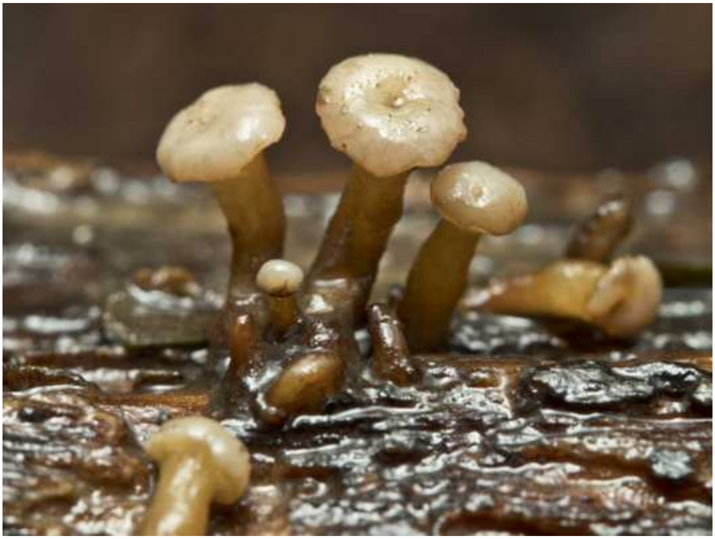

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Fam. Helotiaceae

Cudoniella clavus

Cudoniella aquatica

Biology

Saprotrophic ascomycete; solitary to gregarious on woody debris which is either submerged in fresh water or is in the splash zone of a waterfall.

Fruit-body Description

Height to 20 mm across; stipitate (with a stipe or stalk) disc. **Disc** diameter up to 12 mm, initially convex, then plane to slightly concave. **Inner surface**, spore-bearing, glabrous, moist; colour cream to pale ochre. **Outer surface** glabrous; colour concolorous with hymenium. **Stipe** central, up to 20 mm long and up to 2 mm thick, enlarged at the apex, long enough to lift disc above the water if substrate is submerged; surface slightly rough, matted (use hand lens); colour at apex concolorous with disc, becoming a brownish black to blackish towards the base. **Spore Print** White

Microscopic Features

Ascospores 9.5–15 × 3.5–5 μm, ellipsoidal-fusiform, smooth, hyaline, no oil drops. Asci 85–110 × 8–10 μm, eight-spored, cylindric-clavate. Paraphyses filiform, septate, occasionally branched, tips slightly swollen.

Comments

Cudoniella clavus is a very distinctive fungus and is readily recognised by its pale cream to ochre fruit body, stipitate disc, and aquatic habitat. This species is found on woody debris which is either submerged in fresh water, or is very wet, or is in the splash zone of a waterfall. It is a cosmopolitan species; in the northern hemisphere it is not common but is widespread. In Australia very few sightings have been reported. Although this species is distinctive it is easily overlooked.

References

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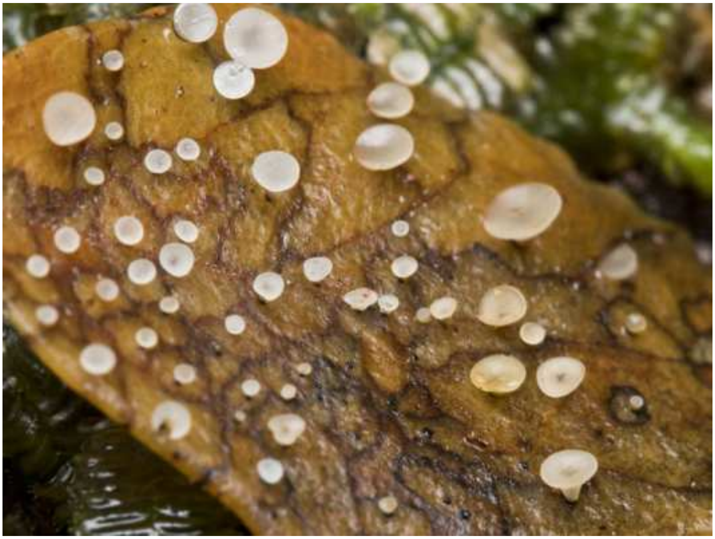
Fam. Helotiaceae

Hymenoscyphus berggrenii



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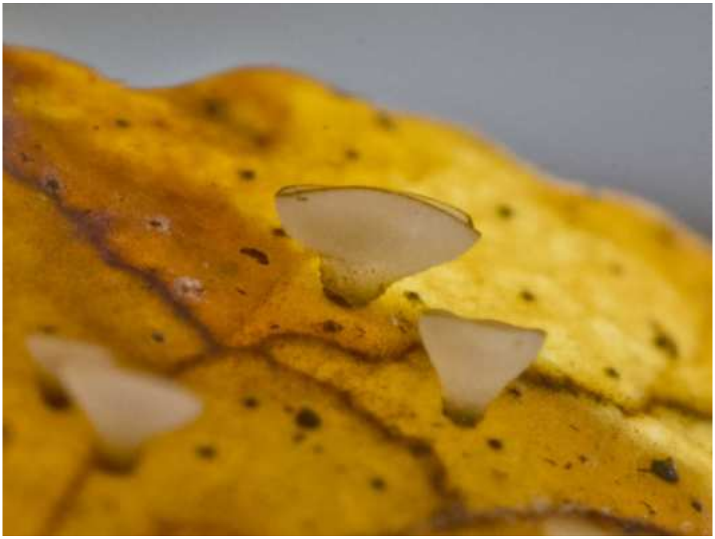

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Fam. Helotiaceae

Hymenoscyphus berggrenii

Lanzia berggrenii *Pezizella nothofagi*
Mollisia nothofagi

Biology

Saprotrophic ascomycete; erumpent on dead leaves of Myrtle Beech *Nothofagus cunninghami*, up to 10 or more fruit-bodies per leaf, forming black demarcation lines around each fruit-body.

Fruit-body Description

Up to 1 mm across, subsessile to short-stipitate disc, convex or plane. **Inner Surface** spore-bearing, smooth, cup-shaped to plane, usually with a dark brown margin; colour whitish to cream. **Outer Surface** smooth, pale, usually covered in a fine network of darkish hyphae, often blackish at the base of the stipe. **Spore Print** White

Microscopic Features

Ascospores 12–15 × 3.5–5 μm, long ellipsoidal, rounded ends, thickest in the middle, smooth, with oil bodies, non-septate. Asci eight-spored, 70–100 × 7–9 μm, cylindrical, slightly narrowed towards base, apex normally rounded. Paraphyses 1.0–1.5 μm diam., filiform, remotely septate, irregularly swollen near apex, often with walking-stick-like branches near apex.

Comments

Hymenoscyphus berggrenii is native to Australia. This tiny species has been renamed a number of times. Spooner (1987) named it *Lanzia berggrenii.* Most recently, Johnston and Park (2013), using DNA evidence, changed this to the current name *Hymenoscyphus berggrenii.*

References

Dennis RWG (1958) “Critical Notes on Some Australian Helotiales and Ostropales”. *Kew Bulletin* **Vol. 13(2), pp. 321–358** **[D I]** (as *Pezizella nothofagi*)

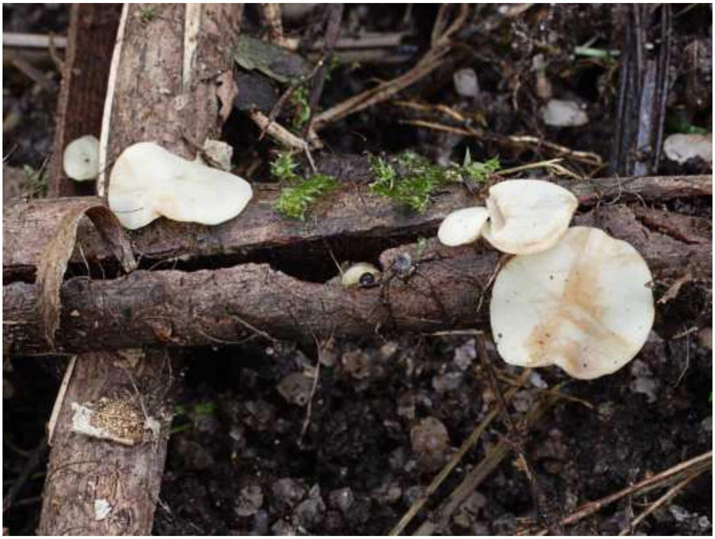
Gates G and Ratkowsky D (2016) *A Field Guide to Tasmanian Fungi.* Tasmanian Field Naturalists Club: Hobart, Tasmania. **p. 222** **[D CP]**

Johnston PR and Park D (2013) “The phylogenetic position of *Lanzia berggrenii* and its sister species”. *Mycosystema* **Vol. 32(3), pp. 366–385** **[D I]**

Spooner BM (1987) “Helotiales of Australasia: Geoglossaceae, Orbiliaceae, Sclerotiniaceae, Hyaloscyphaceae”. *Bibliotheca Mycologica* **Vol. 116, pp. 373–377** **[D I]**(as *Lanzia berggrenii*)

Fam. Helotiaceae

Hymenoscyphus sp. "olive cream with black rhizomorphs"



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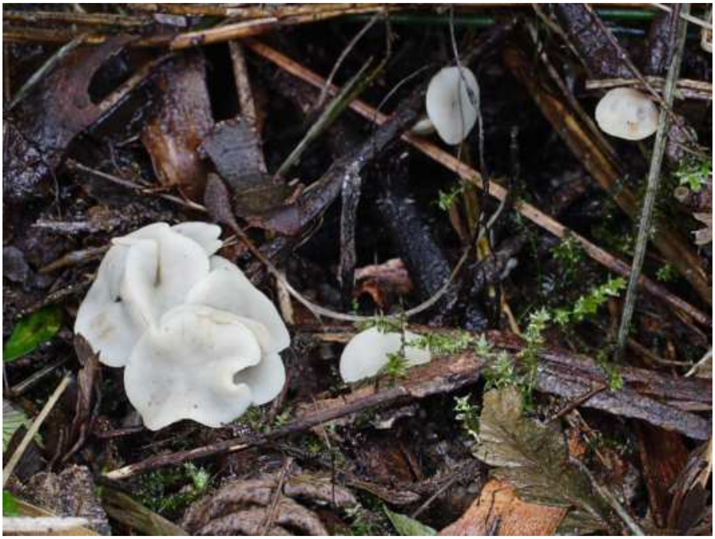

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Fam. Helotiaceae

Hymenoscyphus sp. "olive cream with black rhizomorphs"

Cudoniella pezizoidea sensu Fuhrer (2009)

Biology

Saprotrophic ascomycete; gregarious on moist forest debris, such as decaying bark and twigs; has black rhizomorphs enmeshing the litter.

Fruit-body Description

Up to 15 mm across; disc flat to convoluted when forming dense colonies, bruises brown, and has black rhizomorphs enmeshing the litter, always with a distinct stipe. **Inner Surface** spore-bearing, smooth; colour ranges from olive cream to pale greenish grey. **Outer Surface** smooth, pallid. **Spore Print** White

Microscopic Features

Ascospores 23–26 × 4–5 μm, long ellipsoidal, sausage-shaped, curved, smooth, with oil bodies. Asci 180–200 × 8–12 μm, eight-spored.

Comments

This species can be easily overlooked; fruit-bodies are usually found amongst damp forest debris, often on decaying eucalypt bark. The presence of black rhizomorphs helps to identify this species in the field.

References

Fuhrer B (2009) *A field guide to Australian fungi.* Bloomings Books: Melbourne. **p. 312** **[D CP]** (as *Cudoniella pezizoidea*)

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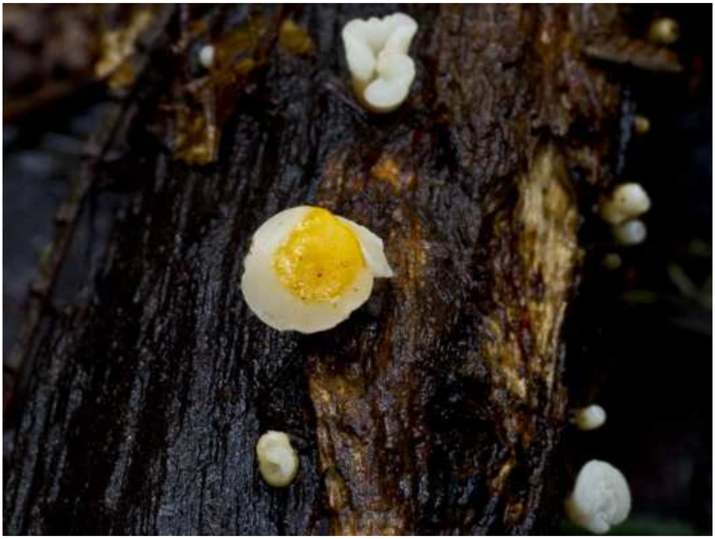
McCann IR (2003) *Australian fungi illustrated.* Macdown Productions: Vermont, Victoria. **p. 113** **[CP]** (as *Cudoniella pezizioidea*)

D=Description; **I**=Illustration; **CI**=Colour Illustration; **P**=Photo; **CP**=Colour Photo

Fam. Helotiaceae

Hymenoscyphus sp. "white bruising orange"



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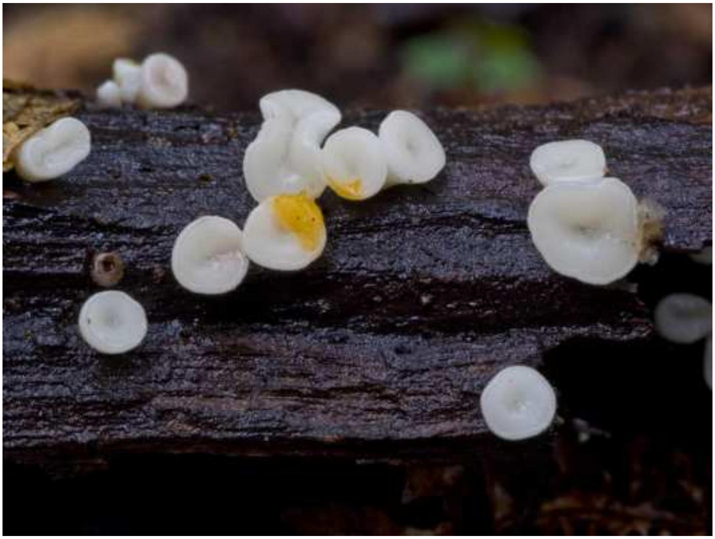

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Fam. Helotiaceae

Hymenoscyphus sp. "white bruising orange"

Biology

Saprotrophic ascomycete; scattered on rotting decorticated wood and on woody debris.

Fruit-body Description

Stipitate (with a stipe or stalk) disc up to 5 mm diameter, height less than diameter of disc, completely white, developing yellow to orange bruises when touched, texture firm gelatinous. **Inner Surface** smooth, plane to convex, with age forming a central depression. **Outer Surface** smooth, concolorous with disc. **Stipe** length usually less than half the diameter of disc. **Spore Print** Not observed

Microscopic Features

Ascospores 13–19.5 × 3.5–5 μm, (mean $16.3 \pm 1.5 \times 4.1 \pm 0.3$ μm, n=30), smooth, cylindric to elongated-ellipsoidal, some curved, ends rounded. Asci 80–150 × 7–9 μm. Paraphyses 1.5–2.5 μm in diameter, multi septate, about the same length as the asci.

Comments

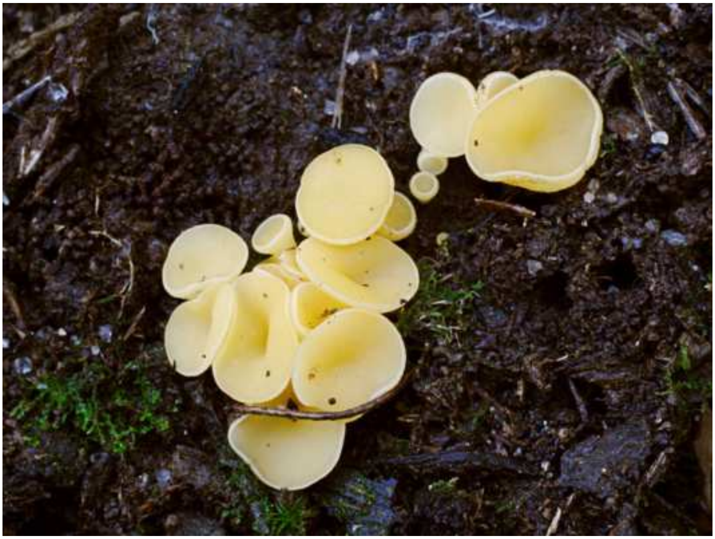
This species is found on decaying wood, and its white discs uniquely bruise with an orangey colour. This feature makes them readily identifiable in the field. Although this species is relatively common, it seems that it has not been described and given a taxonomic name.

References

Gates G and Ratkowsky D (2016) *A Field Guide to Tasmanian Fungi*. 2nd edn. Tasmanian Field Naturalists Club: Hobart, Tasmania. **p. 222 [D CP]**

Fam. Helotiaceae

Phaeohelotium baileyanum



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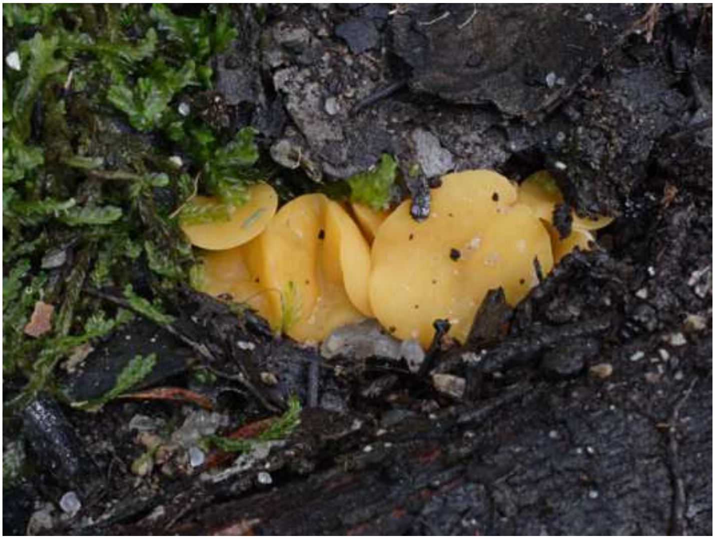

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Fam. Helotiaceae

Phaeohelotium baileyanum

Discinella terrestris

Biology

Possibly mycorrhizal with eucalypts; gregarious on the ground, usually amongst moss.

Fruit-body Description

Disc diameter to 10 mm or more; saucer-shaped to flat disc-like; resting with a short stipe on the ground. **Inner Surface** spore-bearing, smooth; colour yellow to yellow-orange. **Outer Surface** lighter in colour and minutely downy. **Spore Print** White

Microscopic Features

Ascospores 14–25 × 7.5–9 μm, elliptic-fusiform (spindle-shaped), with oil drops. Asci eight-spored, 200–225 × 10–14 μm, with a long stalk. Paraphyses same length as asci, about 2 μm thick, rounded at tips.

Comments

Phaeohelotium baileyanum is identifiable by its yellow to yellow-orange discs on the ground, usually amongst moss. Other disc-shaped species, belonging to the genus *Aleuria*, are much larger and are bright orange. A smaller bright yellow disc, *Bisporella citrina*, is found on wood. Phylogenetic analysis by Baral *et al.* (2013) showed that this species is not *Discinella terrestris* but *Phaeohelotium baileyanum*.

References

Baral H-O, Galan R, Platas G, Tena R (2013) "*Phaeohelotium undulatum* comb. nov. and *Phaeoh. succineoguttulatum* sp. nov., two segregates of the *Discinella terrestris* aggregate found under *Eucalyptus* in Spain: taxonomy, molecular biology, ecology and distribution". *Mycosystema* **Vol. 32(3) pp. 386–428** **[D CP]**

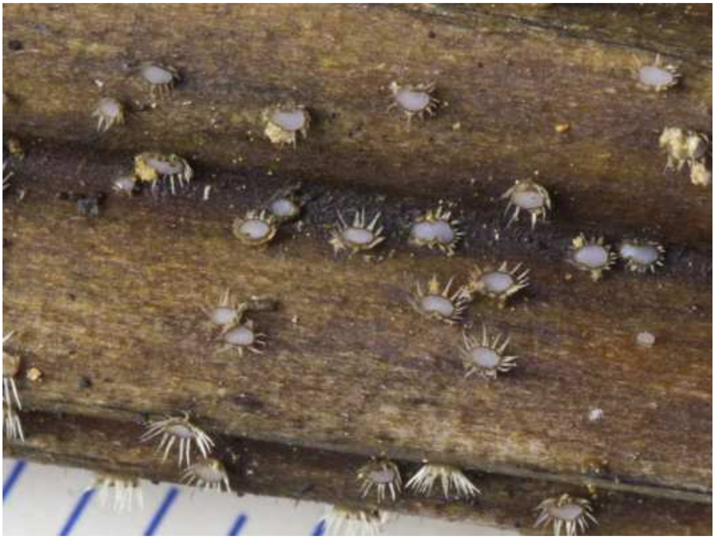
Dennis RWG (1958) "Critical Notes on Some Australian Helotiales and Ostropales". *Kew Bulletin* **Vol. 13(2), pp. 321–358** **[D I]** (as *Discinella terrestris*)

Fuhrer B (2009) *A field guide to Australian fungi.* Bloomings Books: Melbourne. **p. 315** **[D CP]** (as *Discinella terrestris*)

McCann IR (2003) *Australian fungi illustrated.* Macdown Productions: Vermont, Victoria. **p. 113** **[CP]** (as *Discinella terrestris*)

Fam. Hyaloscyphaceae

Hispidula dicksoniae



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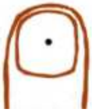

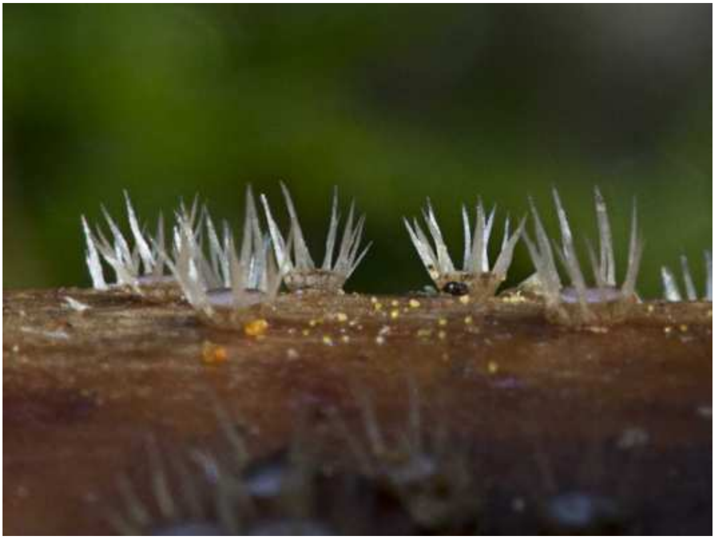

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Fam. Hyaloscyphaceae

Hispidula dicksoniae

Cyathicula dicksoniae

Biology

Saprotrophic ascomycete; found in gregarious groups usually near the base of dead rachises of Soft Tree Fern *Dicksonia antarctica* in wet areas.

Fruit-body Description

Fruit-body 0.5 to 1 mm diameter, sessile, shallow cup-shaped, margin ringed with numerous whitish tapering teeth/hairs up to 1 mm in length. **Inner surface** spore-bearing surface, smooth; flat or slightly depressed, pale yellow to greyish white, with a distinct blackish margin. **Outer Surface** colour can range from the same colour as the disc to black. **Spore Print** White

Microscopic Features

Ascospores 10–14.5 × 3–3.5 μm, ellipsoidal to fusoid, ends more or less acute, flattened on one side, often slightly curved in side view, 0-1 septate. Asci eight-spored, 90–120 × 5.5–7 μm. Paraphyses slender, 1.5 μm diameter, enlarged to 2.5–3 μm at the apex.

Comments

Hispidula dicksoniae can be readily identified from other species in its genus by its colour and blackish margin on the disc; it grows only on dead rachises of Soft Tree Fern *Dicksonia antarctica*, usually around late autumn to early spring.

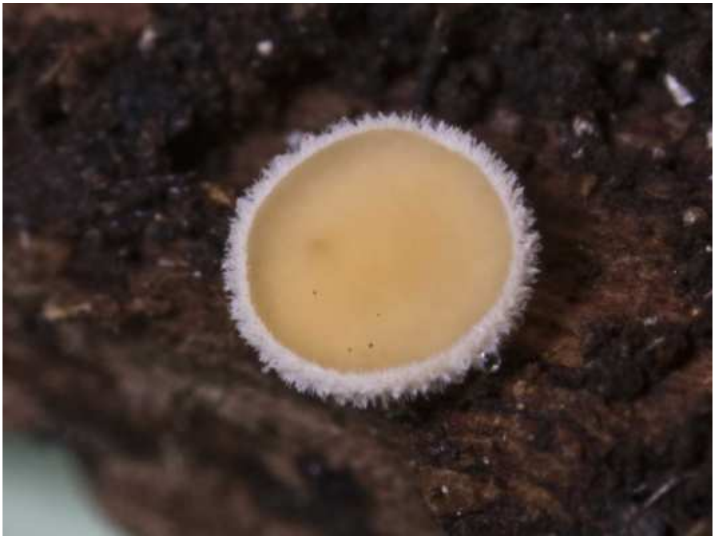
References

Beaton G and Weste G (1977) “New Species of Helotiales and Phacidiales from Australia”. *Transactions of the British Mycological Society*, **Vol. 68(1) pp. 73–77** **[D I]** (as *Cyathicula dicksoniae*)

Johnston PR (2003) “*Hispidula* gen. nov. (Helotiales, Hyaloscyphaceae) in Australia and New Zealand”. **Vol. 41(4) pp. 685–697** **[D P]**

Fam. Lachnaceae

Lachnum lachnoderma



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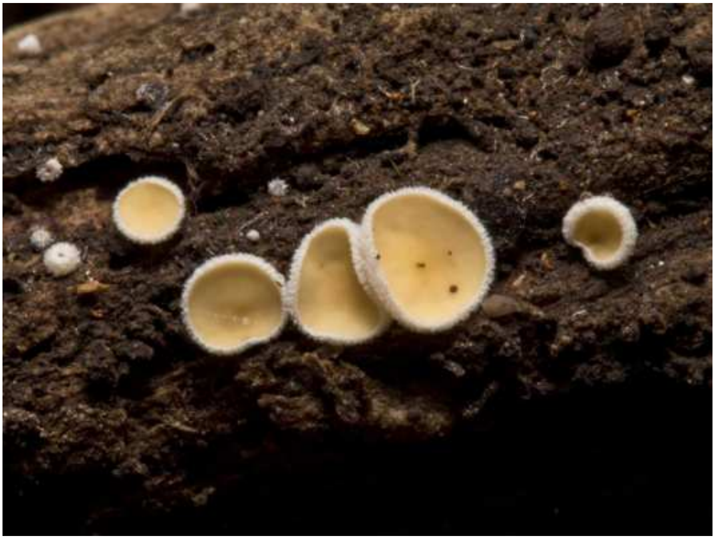

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Fam. Lachnaceae

Lachnum lachnoderma

Peziza lachnoderma *Dasyscyphus lachnodermus*

Biology

Saprotrophic ascomycete; gregarious to scattered, found on dead wood and rotten branches of various non-coniferous trees. It is relatively common on *Olearia* species such as the Musk Daisy-bush *Olearia argophylla*.

Fruit-body Description

Short-stipitate disc, up to 4 mm across, stipe up to 1 mm long, the larger fruit-bodies have the appearance of being sessile. **Inner Surface** spore-bearing, smooth, cup-shaped to plane; colour orangey yellow to orange. **Outer Surface** densely clothed with white hairs. **Spore Print** White

Microscopic Features

Ascospores 15–29 × 1.5–2.5 μm, smooth, hyaline, narrowly fusiod, both ends equally tapered, 1–septate. Asci eight-spored, 80–90 × 5–6.5 μm, cylindric-clavate, apex conical. Paraphyses lanceolate, diameter up to 5 μm, exceeding asci by up to 20 μm. Hairs cylindric, septate, surface finely granulate, apex either slightly tapered or obtuse, tip rounded.

Comments

Lachnum lachnoderma is one of the large species of *Lachnum*, which can be recognised by its large size (2 mm or more across) and its orangey yellow disc with the outer surface clothed with white hairs. The author has found this species on a number of occasions, always on rotten wood of the Musk Daisy-bush *Olearia argophylla*. (Note: Mature discs that are less than 1 mm across are most likely a different species.)

References

Dennis RWG (1958) "Critical Notes on Some Australian Helotiales and Ostropales". *Kew Bulletin* **Vol. 13(2), pp. 321–358** **[D I]** (as *Dasyscyphus lachnodermus*)

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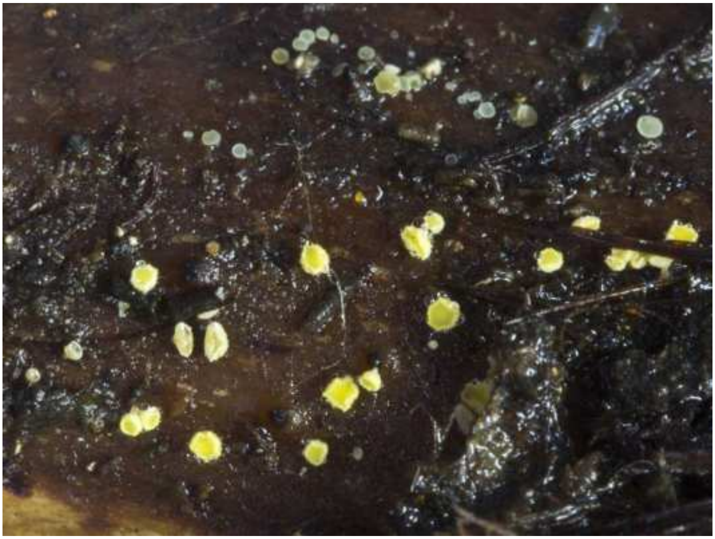
Spooner BM (1987) "Helotiales of Australasia: Geoglossaceae, Orbiliaceae, Sclerotiniaceae, Hyaloscyphaceae". *Bibliotheca Mycologica* **Vol. 116, pp. 550–564** **[D I]**

Fam. Lachnaceae

Lachnum pteridophyllum



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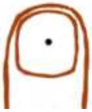

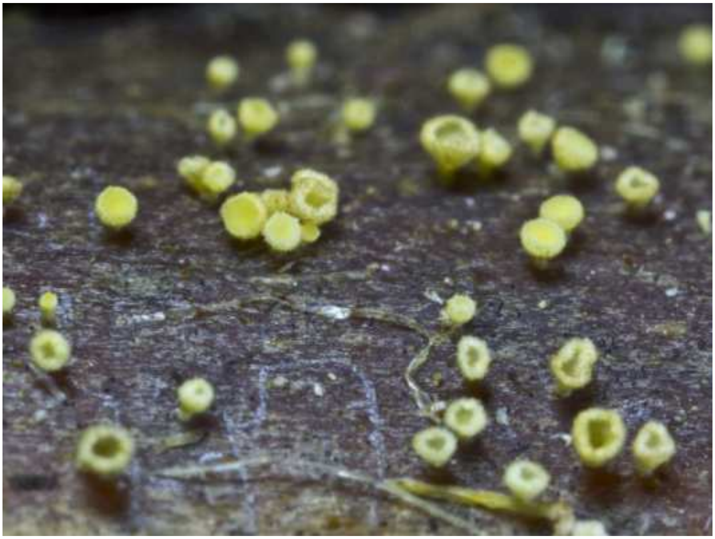

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Fam. Lachnaceae

Lachnum pteridophyllum

Lachnum varians var. *pteridophyllum* *Dasyscyphus pteridophyllus*
Dasyscypha pteriodophylla *Dasyscyphus varians* var. *pteridophyllus*

Biology

Saprotrophic ascomycete; gregarious, found in large colonies in wet forest or rainforest. So far we have found it only on dead rachises of the Soft Tree Fern *Dicksonia antarctica.* There are reports that it may also be found on the dead rachises of the Rough Tree Fern *Cyathea australis.*

Fruit-body Description

Minute, up to 0.8 mm across; cup-shaped, with a stipe up to 0.5 mm long. **Inner Surface** spore-bearing, smooth and pale yellow, often covered by cup margin. **Outer Surface** densely clothed with yellowish to golden hairs. **Spore Print** White

Microscopic Features

Ascospores 15–19 × 1–2 μm, smooth, fusiform (spindle-shaped), cylindrical, with pointed tips. Asci eight-spored, 48–70 × 4–5.5 μm.

Comments

Lachnum pteridophyllum fruit-bodies are minute stipitate cups, with yellow or golden hairs on the outside, while the smooth inner cup is yellowish. They grow on dead tree fern fronds, which makes them relatively easy to locate and identify. To date we have found this species only on the rachises of dead fronds of the Soft Tree Fern.

References

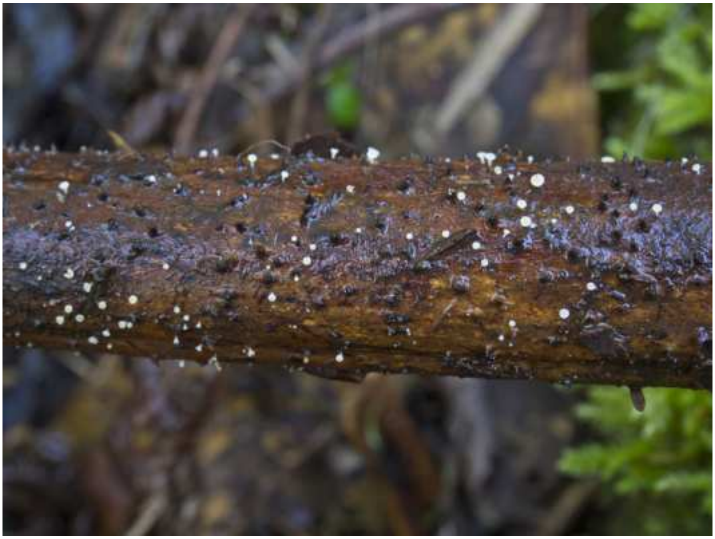
Dennis RWG (1958) "Critical Notes on Some Australian Helotiales and Ostropales". *Kew Bulletin* **Vol. 13(2), pp. 321–358** **[D I]** (as *Dasyscyphus pteridophyllus*)

Haines JH (1980) "Studies in the Hyaloscyphaceae I: Some Species of Dasyscyphus on Tropical Ferns". *Mycotaxon* **Vol. 11(1), pp. 189–216** **[D I]** (as *Dasyscyphus varians* var. *pteridophyllus*)

Spooner BM (1987) "Helotiales of Australasia: Geoglossaceae, Orbiliaceae, Sclerotiniaceae, Hyaloscyphaceae". *Bibliotheca Mycologica* **Vol. 116, pp. 119–123** **[D I]**

Fam. Lachnaceae

Lachnum cf. *varians*



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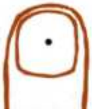

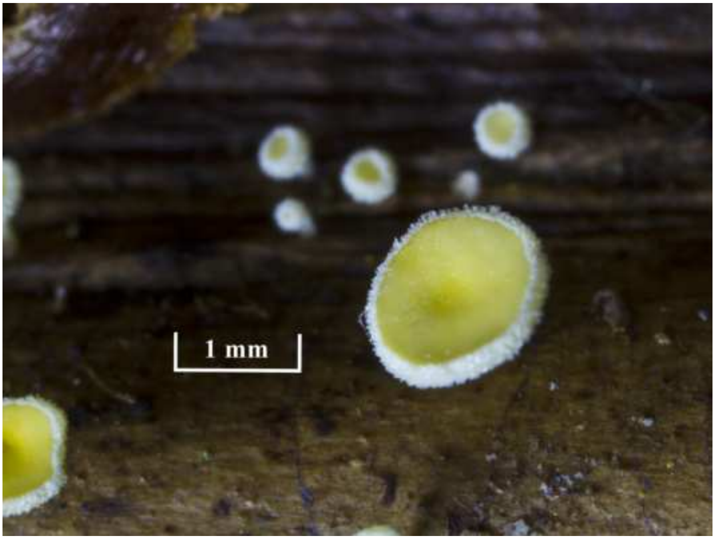

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Fam. Lachnaceae

Lachnum cf. *varians*

Biology

Saprotrophic ascomycete; gregarious, found in large colonies on the stems (rachises) of dead tree fern fronds. So far we have found it only on Rough Tree Fern *Cyathea australis* in wet forest or in rainforest.

Fruit-body Description

Minute, up to 1.5 mm across; cup-shaped, stipe length approximately that of disc diameter. **Inner Surface** spore-bearing, smooth and pale yellow, in wet conditions may bleach to white. **Outer Surface** densely clothed with white or creamy hairs. **Spore Print** White

Microscopic Features

Ascospores 14–19 × 2.5–4 μm, (mean 16.0 ± 1.6 × 3.5 ± 0.3 μm, n=144), smooth, long ellipsoidal with rounded ends. Asci eight-spored, 73–81 × 6.5–8 μm, cylindric-clavate.

Comments

Lachnum cf. *varians* fruit-bodies are minute stipitate cups, with whitish hairs on the outside, while the smooth inner cup is yellowish. To date they have been found growing only on dead rachises of Rough Tree Fern. They are also the most common *Lachnum* found during our forays. The image and spore measurement given in Fuhrer (2009) is consistent with it being *Lachnum* cf. *varians*.

References

Fuhrer B (2009) *A field guide to Australian fungi.* Bloomings Books: Melbourne. **p. 324** **[D CP]** (as *Lachnum pteridophyllum*)

Mendel R, Lorea-Hernández (2008) "*Hyaloscyphaceae* (Ascomycota) growing on tree ferns Mexico". *Mycotaxon* **Vol. 106, pp. 209–217** **[D I]**

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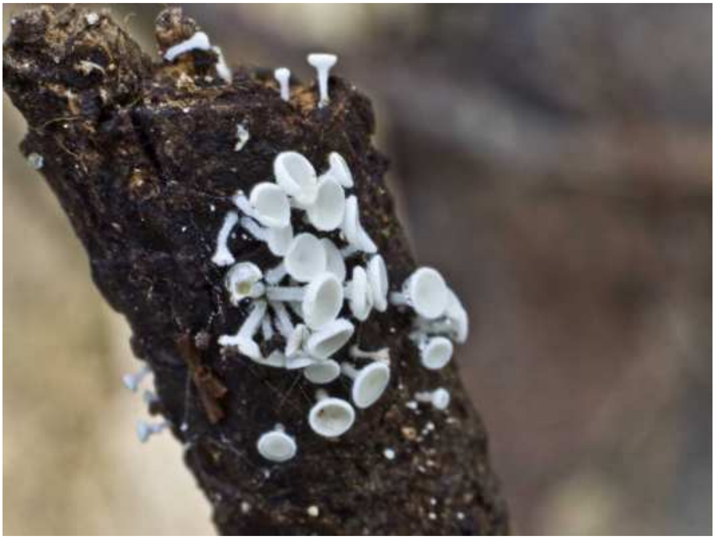
Fam. Lachnaceae

Lachnum virgineum



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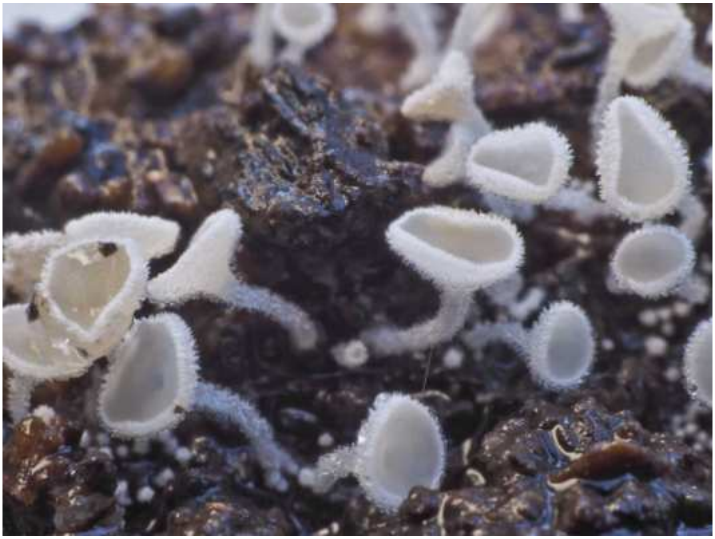

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Fam. Lachnaceae

Lachnum virgineum

Biology

Saprotrophic ascomycete; gregarious to scattered, found on moist dead wood and woody debris.

Fruit-body Description

Short-stipitate disc, up to 2 mm across, stipe up to 1 mm long, goblet-shaped when young, finally becoming disc-shaped. **Inner Surface** spore-bearing, smooth, cup-shaped to plane; colour white, may dry to a very pale yellow. **Outer Surface** densely clothed with white hairs. **Spore Print** White

Microscopic Features

Ascospores 7–10.5 × 1.5–2 μm, smooth, hyaline, narrowly fusiod, both ends tapered but usually rounded, non–septate. Asci eight-spored, spores uniseriate (in a single line), 45–60 × 4.5–6 μm, cylindric-clavate, apex conical. Paraphyses lanceolate, septate, diameter up to 5 μm, exceeding asci by up to 20 μm. Hairs cylindric, septate, surface finely granulate, apex either slightly tapered or obtuse, tip rounded, sometimes swollen.

Comments

Lachnum virgineum is the type species for the genus, and can be recognised by its overall white appearance, with its outer surface covered in white hairs, and growing on dead wood or woody debris. Even so, care must be taken when identifying this species in the field as there are more than 260 species of *Lachnum*. *Lachnum virgineum* is cosmopolitan, and is common in both northern and southern hemispheres.

References

Breitenbach J and Krãnzlin F (1984) *Fungi of Switzerland* Vol. 1: Ascomycetes. Verlag Mykologia: Luzern, Switzerland. **p. 194 [D CP]** (as *Dasyscyphus virgineus*)

Dennis RWG (1958) “Critical Notes on Some Australian Helotiales and Ostropales”. *Kew Bulletin* **Vol. 13(2), pp. 321–358 [D I]** (as *Dasyscyphus virgineus*)

Fuhrer B (2009) *A field guide to Australian fungi*. Bloomings Books: Melbourne. **p. 324 [D CP]**

Gates G and Ratkowsky D (2016) *A Field Guide to Tasmanian Fungi*. 2nd edn. Tasmanian Field Naturalists Club: Hobart, Tasmania. **p. 227 [D CP]**

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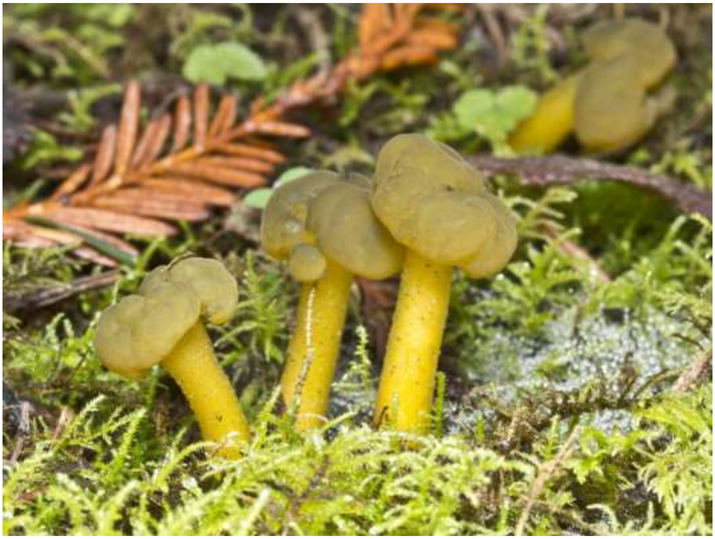
Fam. Leotiaceae

Leotia lubrica



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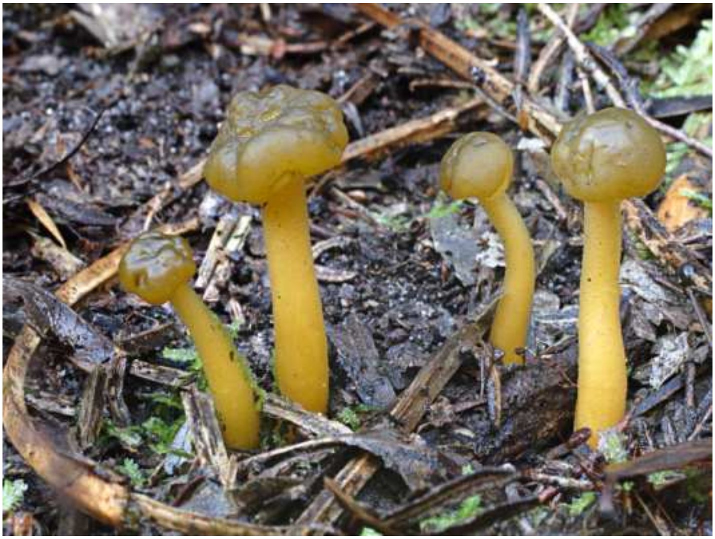

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Fam. Leotiaceae

Leotia lubrica

Biology

Saprotrophic ascomycete; solitary, gregarious or caespitose on soil or highly decayed mulch in wet forest.

Fruit-body Description

Up to 80 mm or more tall, consisting of a pileus and a stipe, flesh gelatinous. **Pileus** up to 20 mm diameter or more and between one quarter and one sixth of the total height, convex or hemispheric, usually lobed and convoluted, margin inrolled; surface glabrous; colour varies from yellow to yellow-green or olive-brown. **Stipe** up to 50 mm long and 10 mm thick; surface viscid when young and moist, sparsely covered with fine scales; colour light yellow to ochre, occasionally with tints of green. **Spore Print** White

Microscopic Features

Ascospores 16–24 × 4–6 μm, smooth, fusiform (spindle-shaped), elongate-ellipsoidal, 3–5 septate. Asci eight-spored, 130–140 × 8–12 μm, spores uniseriate (in a single line). Paraphyses filiform, forked, tips thickened.

Comments

Leotia lubrica is identified in the field by the gelatinous rubbery texture of its well defined pileus and stipe, and its overall yellowish colour. It is so distinctive that it cannot readily be confused with any other species. It is found in both the northern and southern hemispheres. *Leotia lubrica* was broken up into a small number of species based on a number of morphological characteristics, one of these being the amount of green in the fruit-body. DNA analysis (Zhong and Pfister 2004) showed that most of these species were variations of *L. lubrica*. Simplified, the results showed that if the fresh fruit-body has yellow in the stipe, it is *L. lubrica*, and if the whole fruit-body is green, it is most likely *L. atrovirens*. The sister genus/clade to *Leotia* is *Microglossum*.

References

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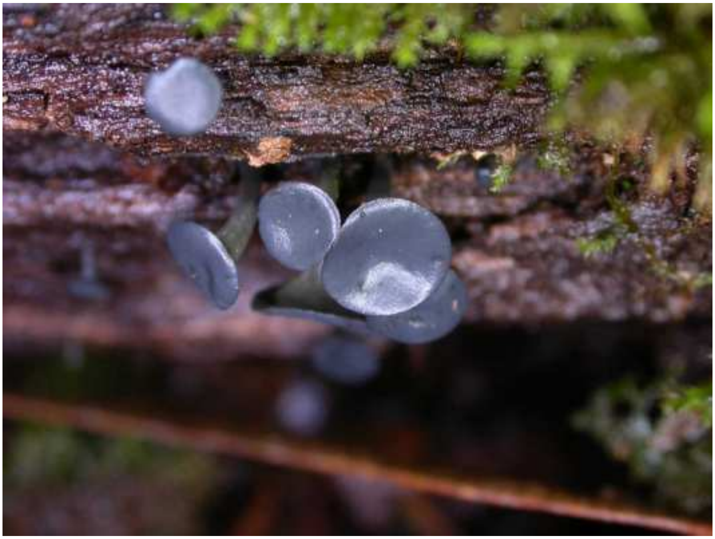
Fam. Rutstroemiaceae

Lanzia lanaripes



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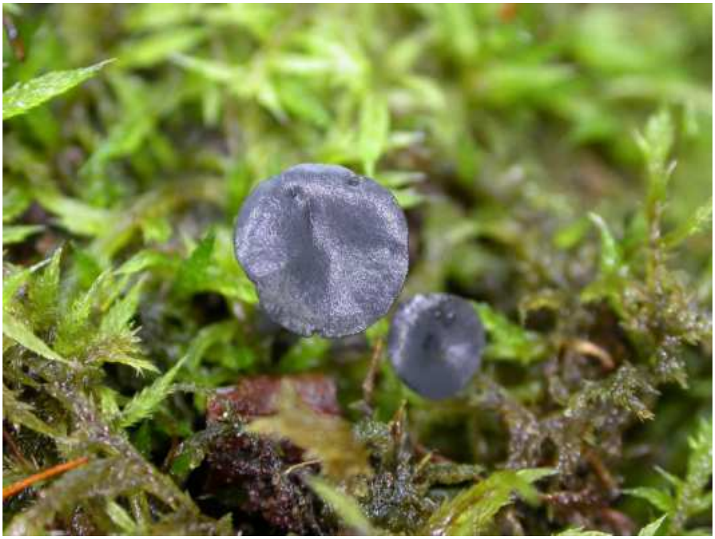

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Fam. Rutstroemiaceae

Lanzia lanaripes

Ruststroemia lanaripes

Biology

Saprotrophic ascomycete; solitary or gregarious on moist or wet decaying logs.

Fruit-body Description

Up to 10 mm across; disc convex, plane or funnel-shaped, with a stipe up to 15 mm long; colour dark grey to black, sometimes with an olivaceous hue. **Inner Surface** spore-bearing, glabrous. **Outer Surface** including stipe, glabrous, sometimes stipe may appear slightly pruinose. **Spore Print** White

Microscopic Features

Ascospores 13–17 × 3.5–4.5 μm, smooth, fusiform (spindle-shaped), elongate-ellipsoidal, 1–3 septate. Asci eight-spored, 115–125 × 7–9 μm.

Comments

Lanzia lanaripes fruit-bodies can be identified in the field because they look like black broad-headed tacks sticking out of a rotting log. They are found in wet forest and rainforest.

References

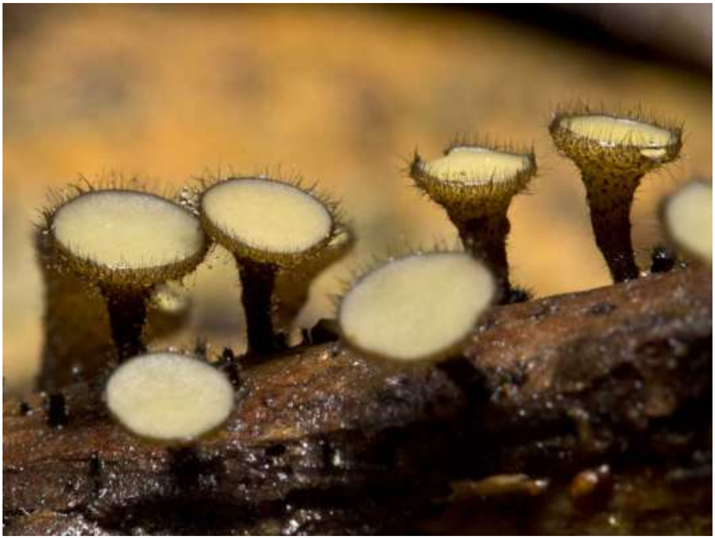
Dennis RWG (1958) “Critical Notes on Some Australian Helotiales and Ostropales”. *Kew Bulletin* **Vol. 13(2), pp. 321–358** **[D I]** (as *Ruststroemia lanaripes*)

Fuhrer B (2009) *A field guide to Australian fungi.* Bloomings Books: Melbourne. **p. 325** **[D CP]**

Gates G and Ratkowsky D (2016) *A Field Guide to Tasmanian Fungi.* 2nd edn. Tasmanian Field Naturalists Club: Hobart, Tasmania. **p. 228** **[D CP]**

Fam. Sclerotiniaceae

Hymenotorrendiella clelandii



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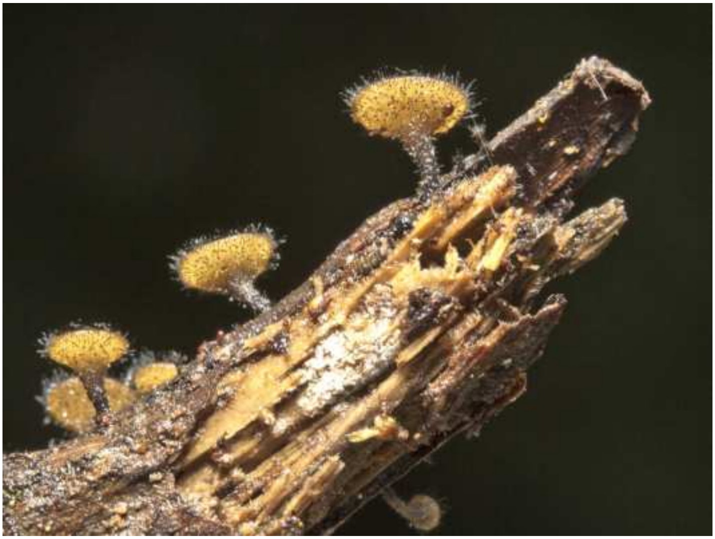

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Fam. Sclerotiniaceae

Hymenotorrendiella clelandii

Zoellneria clelandii *Torrendiella clelandii*

Biology

Saprotrophic ascomycete; scattered or gregarious on wood and twigs of *Eucalyptus* species, to which this species is most likely restricted.

Fruit-body Description

Up to 6 mm or more across; disc-shaped, on a slender stipe. **Inner Surface** spore-bearing, slightly concave or plane, smooth, soft-fleshed, light yellowish grey when fresh, drying orange. **Outer Surface** same colour as disc, covered in numerous long, fine, very dark brown hairs. **Stipe** central, slightly tapered, length variable up to 6 mm or more, similar colour to disc, sometimes darker towards the base, also covered with fine dark hairs. **Spore Print** White

Microscopic Features

Ascospores 17–21 × 4–6 μm, ellipsoidal-fusiform, sometimes slightly curved, non-septate, sometimes with several oil drops. Asci eight-spored, 120–160 × 8–10 μm. Paraphyses fusiform, septate, about the same length as the asci.

Comments

Hymenotorrendiella clelandii, which is found on *Eucalyptus* wood and twigs, is readily identified by its relatively large size, colour, and hairy outer surface. This fungus was previously known as *Torrendiella clelandii* (Spooner 1987), but phylogenetic analysis performed by Johnston *et al.* (2014) has shown that southern hemisphere species of *Torrendiella* are phylogenetically distinct from northern hemisphere species, being more closely related to *Hymenoscyphus* spp. than to *Torrendiella* spp., therefore they have been placed into the new genus *Hymenotorrendiella*.

References

Beaton G and Weste G (1977) "*Zoellneria* species from Victoria, Australia". *Transactions of the British Mycological Society* **Vol. 68(1), pp. 79–84** [D I] (as *Zoellneria clelandii*)

Dennis RWG (1958) "Critical notes on some Australian Helotiales and Ostropales". *Kew Bulletin* **Vol. 13(2), pp. 321–358** [D I] (as *Zöllneria eucalypti*)

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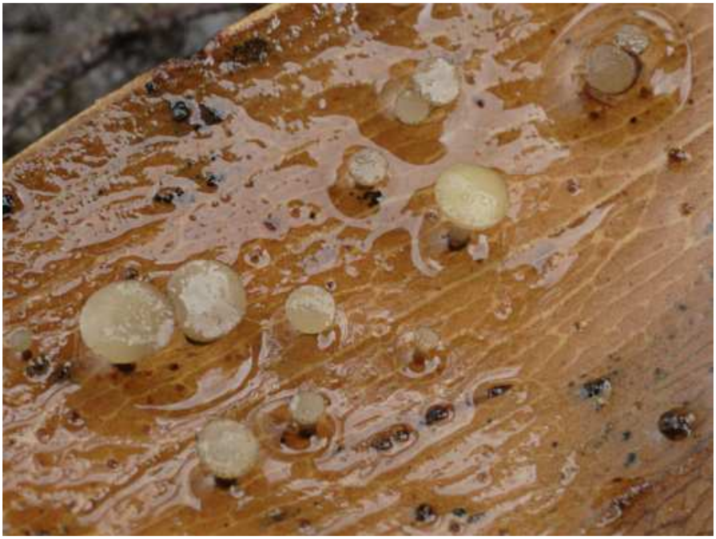
Johnston PR, Park D, Baral H-O, Galan R, Platas G and Tena R (2014) "The phylogenetic relationships of *Torrendiella* and *Hymenotorrendiella* gen. nov. within the Leotiomycetes". *Phytotaxa* **Vol. 177(1), pp. 1–25** [D CP]

Spooner BM (1987) “Helotiales of Australasia: Geoglossaceae, Orbiliaceae, Sclerotiniaceae, Hyaloscyphaceae”. *Bibliotheca Mycologica* **Vol. 116, pp. 1–711** **[D I]** (as *Torrendiella clelandii*)

Fam. Sclerotiniaceae

Hymenotorrendiella eucalypti



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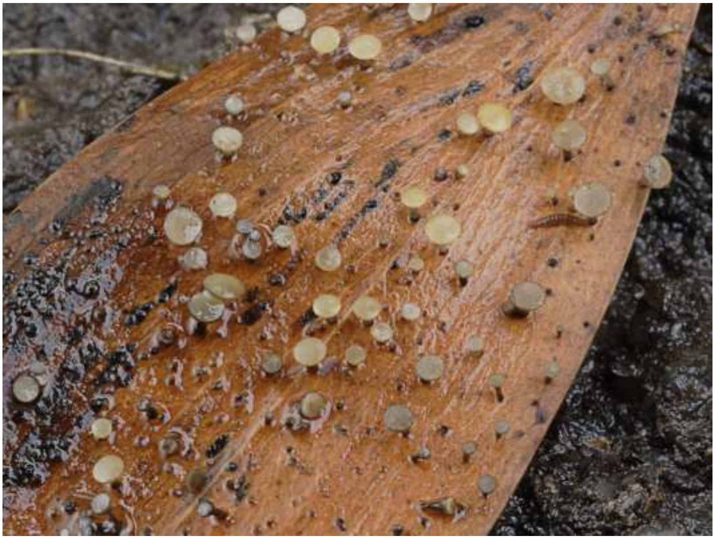

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Fam. Sclerotiniaceae

Hymenotorrendiella eucalypti

Peziza eucalypti
Zoellneria eucalypti
Zoellneria callochaetes
Ciboria strigosa
Torrendiella eucalypti

Biology

Parasitic and saprotrophic ascomycete; infects leaves of Blackwood *Acacia melanoxylon*; the fruit-bodies appear singly or scattered in small colonies on leaves that have fallen to the ground.

Fruit-body Description

Up to 1.5 mm or more across; disc-shaped to cup-shaped on a slender stipe. **Inner Surface** spore-bearing, slightly concave or convex, smooth, yellowish-white when fresh, drying to pale yellow, with scattered brown bristles on the margin. **Outer Surface** same colour as disc, free of hairs. **Stipe** central, up to 1.5 mm long and 0.25 mm thick, similar colour to disc, sometimes darker towards the base. **Spore Print** White

Microscopic Features

Ascospores 14–19 × 3–5 μm, ellipsoidal-fusiform, with pointy ends, sometimes slightly curved, non-septate, with several oil drops. Asci eight-spored, 75–110 × 8–10 μm. Paraphyses cylindrical with rounded tips, often containing yellow oily matter in the upper part.

Comments

Hymenotorrendiella eucalypti is readily identified by its small size, yellowish colour, bristles at the margin of the disc, and presence on the fallen leaves of Blackwood *Acacia melanoxylon* trees. Although Spooner (1987) and Dennis (1958) have it also occurring on *Eucalyptus* leaves, it is now thought to be host-specific to *Acacia melanoxylon*. Phylogenetic analysis performed by Johnston *et al.* (2014) has shown that southern hemisphere species of *Torrendiella* are phylogenetically distinct from northern hemisphere species, being more closely related to *Hymenoscyphus* spp. than to *Torrendiella* spp., therefore they have been placed into the new genus *Hymenotorrendiella*.

References

Beaton G and Weste G (1977) "*Zoellneria* species from Victoria, Australia". *Transactions of the British Mycological Society* **Vol. 68(1), pp. 79–84** **[D I]** (as *Zoellneria eucalypti*)

Dennis RWG (1958) "Critical notes on some Australian Helotiales and Ostropales". *Kew Bulletin* **Vol. 13(2), pp. 321–358** **[D I]** (as *Zoellneria eucalypti*)

Gates G and Ratkowsky D (2016) *A Field Guide to Tasmanian Fungi.* 2nd edn. Tasmanian Field Naturalists Club: Hobart, Tasmania. **p. 223 [D CP]**

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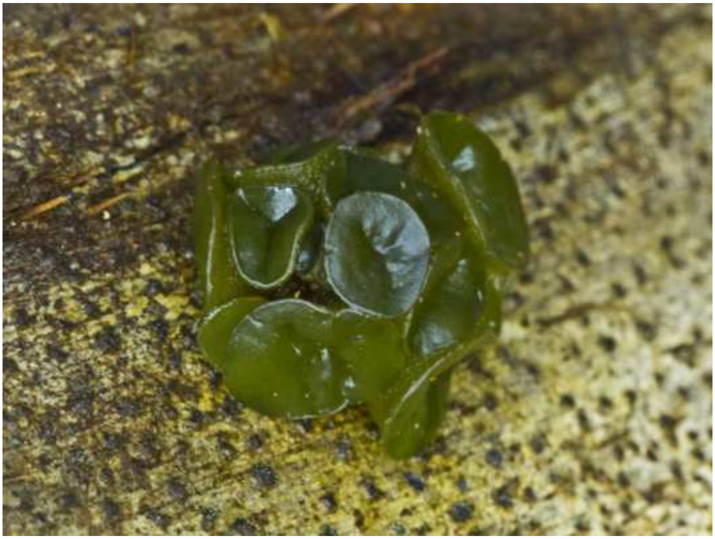
Spooner BM (1987) "Helotiales of Australasia: Geoglossaceae, Orbiliaceae, Sclerotiniaceae, Hyaloscyphaceae". *Bibliotheca Mycologica* **Vol. 116, pp. 1–711 [D I]** (as *Torrendiella eucalypti*)

Fam. Tympanidaceae

Claussenomyces australis



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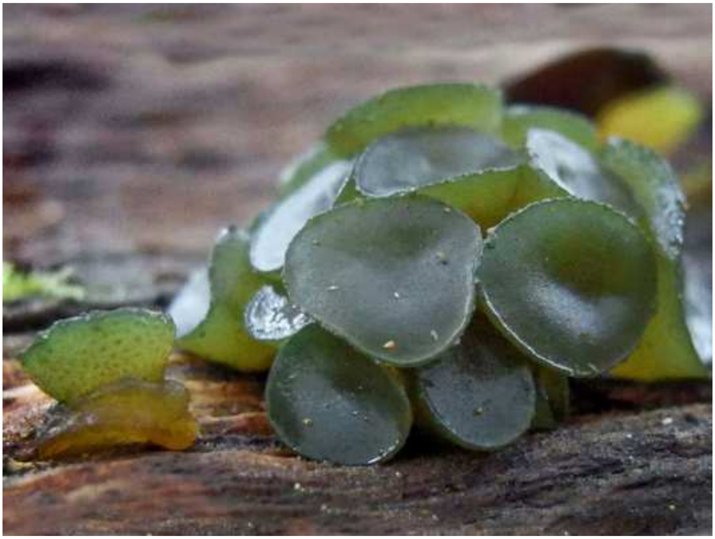

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Fam. Tympanidaceae

Claussenomyces australis

Ionomidotis australis

Biology

Saprotrophic ascomycete; scattered or caespitose on decaying eucalypt wood in wet forests.

Fruit-body Description

Disc diameter up to 25 mm; convex, flat or distorted when in a caespitose cluster; gelatinous; fruit-body truncate-conical, sessile, or broadly attached to the substrate. **Upper Surface** spore-bearing, smooth when fresh to slightly wrinkled and roughened when dry; ivy green when fresh, drying to black. **Lower Surface** smooth; same colour as upper surface. **KOH-extractable pigment** pigment extracted in a 5% aqueous KOH solution is reddish-purple to purple. **Spore Print** Not observed

Microscopic Features

Ascospores 5–7.5 × 1.5–2.5 μm, ellipsoidal to rod-shaped, slightly constricted in the middle, smooth, with 2 oil drops, irregularly biseriate. Asci eight-spored, 30–38 × 4–5 μm, clavate.

Comments

This species can be tentatively identified by the gelatinous ivy green of the discs, growing on wood. Microscopic examination is required for positive identification. The genus *Claussenomyces* and closely related genera such as *Ionomidotis* and *Ameghiniella* all have a number of gelatinous greenish disc-shaped species. There is still some doubt concerning which genus this species belongs to; both Zhuang (1986) and Gamundi *et al.* (1995), suggest that it should be placed in the genus *Ionomidotis* based on microscopic features, such as the one-celled ascospores and the absence of ascoconidia, which are not characteristic of *Claussenomyces* species. At present not enough is known about this and related species. Until there is, it is prudent to keep this species in the genus *Claussenomyces*.

References

Beaton GW and Weste G (1979) “Four inoperculate discomycetes from Victoria, Australia”. *Transactions of the British Mycological Society* **Vol. 71(2). pp. 215–221** **[D I]**

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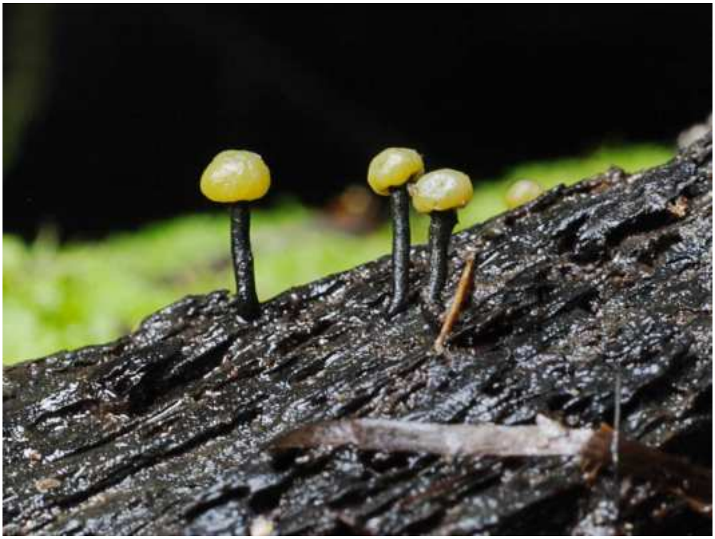
Gates G and Ratkowsky D (2016) *A Field Guide to Tasmanian Fungi.* 2nd edn. Tasmanian Field Naturalists Club: Hobart, Tasmania. **p. 217** **[D CP]**

Zhuang W-y (1986) "Studies on some discomycete genera with an ionomidotic reaction: *Ionomidotis*, *Poloniodiscus*, *Cordierites*, *Phyllomyces* and *Ameghiniella*". *Mycotaxon* **Vol. 31(2), pp. 261–298** **[D I]**(as *Ionomidotis australis*)

D=Description; **I**=Illustration; **CI**=Colour Illustration; **P**=Photo; **CP**=Colour Photo

Fam. Vibrisseaceae

Chlorovibrissea bicolor



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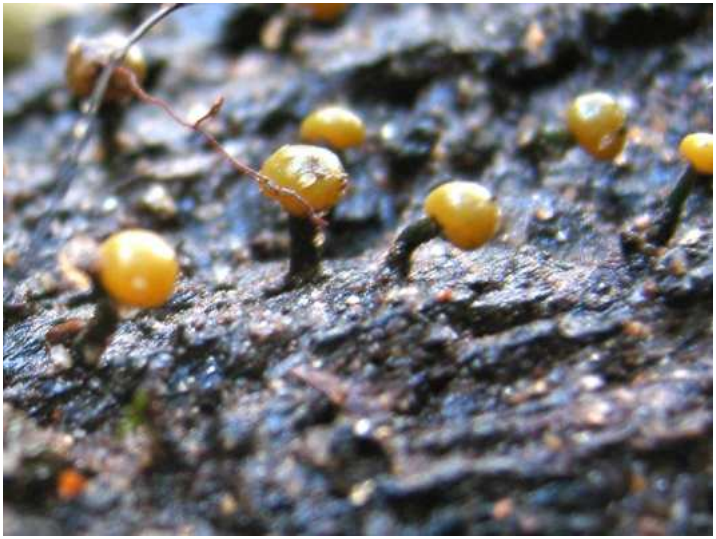

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Fam. Vibrisseaceae

Chlorovibrissea bicolor

Vibrissea bicolor

Biology

Saprotrophic ascomycete; gregarious on rotting wood totally or partly immersed in running water.

Fruit-body Description

A pin-shaped fruit-body up to 20 mm high; the head (pileus) of the fruit-body is fertile, globose or lobed, up to 5 mm diameter; colour yellow. Stipe up to 15 mm long, up to 1 mm thick; cylindrical or slightly tapering; surface smooth; colour dark green when fresh. **Spore Print** not observed

Microscopic Features

Ascospores 53–60 × 1.5–2 μm, filiform, thinner at one end, with numerous oil drops; no septation observed. Asci eight-spored, 130–160 × 5–7 μm, clavate, with a long tapering base.

Comments

This species is relatively unique because it is one of the few species of its type that is found on partly or totally immersed rotting wood. It is also identifiable by its yellow head (pileus) and very dark green to almost black stipe.

References

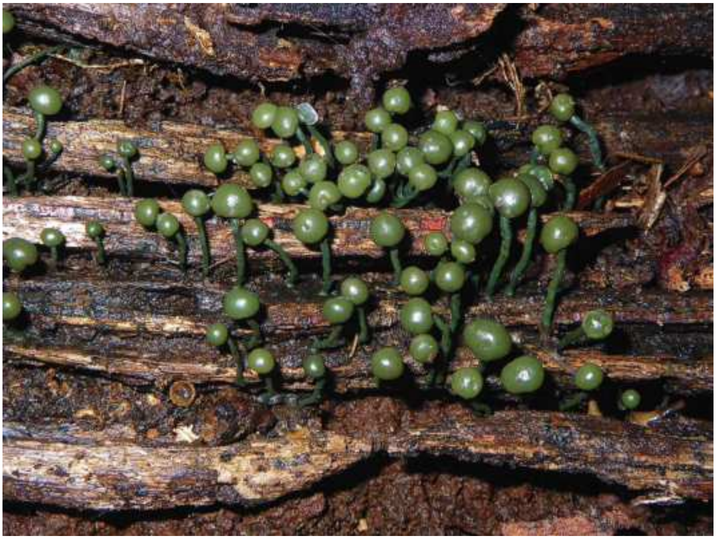
Beaton GW and Weste G (1977) “Australian Discomycetes: a new *Vibrissea* species”. *Transactions of the British Mycological Society* **Vol. 69(2). pp. 323–325** **[D I]**

Fuhrer B (2009) *A field guide to Australian fungi.* Bloomings Books: Melbourne. **p. 307** **[D CP]**

Grey P and Grey E (2005) *Fungi down under: the Fungimap guide to Australian fungi.* Fungimap: South Yarra, Victoria. **p. 116** **[D CP]**

Fam. Vibrisseaceae

Chlorovibrissea melanochlora



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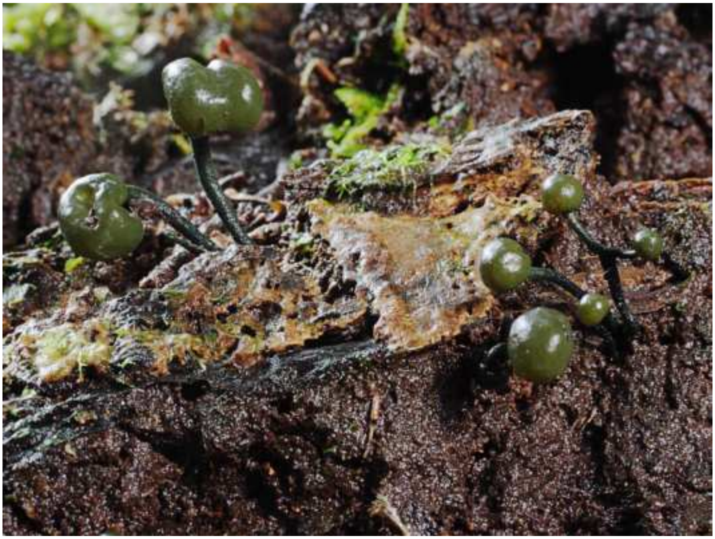

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Fam. Vibrisseaceae

Chlorovibrissea melanochlora

Vibrissea melanochlora

Biology

Saprotrophic ascomycete; gregarious in cracks and hollows in saturated rotting eucalypt logs.

Fruit-body Description

A pin-shaped fruit-body up to 30 mm high; the head (pileus) of the fruit-body is fertile, globose, sometimes with lobes, up to 7 mm diameter; colour parsley green. Stipe up to 25 mm long and up to 1 mm thick; cylindrical or slightly tapering; surface smooth; colour a darker parsley green than the head. **Spore Print** not observed

Microscopic Features

Ascospores 100–115 × 1–5 μm, filiform, slightly tapered, with numerous oil drops, continuous at first, becoming up to 9-septate. Asci eight-spored, 180–200 × 7–9 μm, clavate, with a long tapering base.

Comments

This is a relatively rare species. Its main identifying feature is that the whole fruit-body is parsley green. It is a difficult fungus to find, especially if only the green fertile head appears above a mossy background.

References

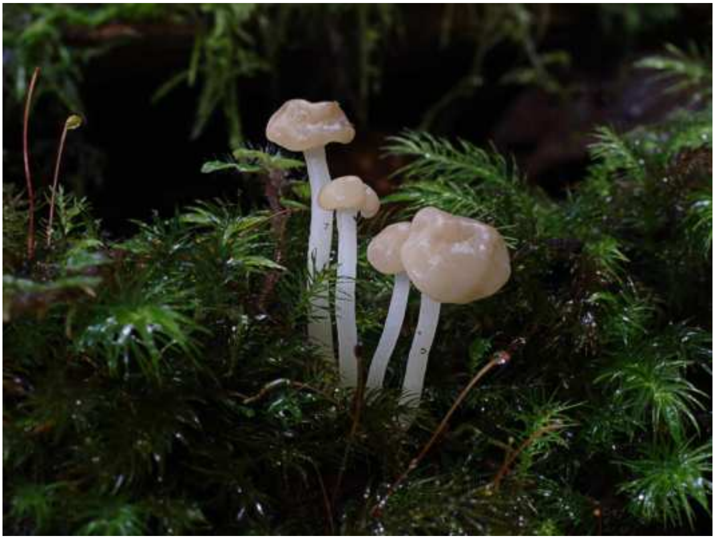
Beaton GW and Weste G (1976) "Australian Discomycetes: log-inhabiting *Vibrissea* species". *Transactions of the British Mycological Society* **Vol. 67(1). pp. 129–132 [D I]**

Fuhrer B (2009) *A field guide to Australian fungi*. Bloomings Books: Melbourne. **p. 308 [D CP]**

Gates G and Ratkowsky D (2016) *A Field Guide to Tasmanian Fungi*. 2nd edn. Tasmanian Field Naturalists Club: Hobart, Tasmania. **p. 217 [D CP]**

Fam. Vibrisseaceae

Vibrissea dura



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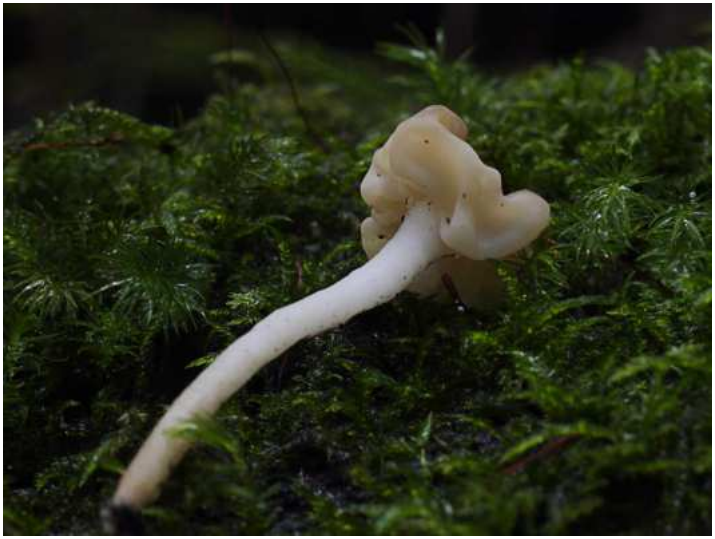

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Fam. Vibrisseaceae

Vibrissea dura

Biology

Saprotrophic ascomycete; solitary, in groups, or caespitose on wet decaying wood in wet forests.

Fruit-body Description

A 'map pin'-like fruit-body with a globose to irregularly globose fertile head (pileus) on top of a stipe. **Pileus** diameter 7 mm or more; globose to irregularly globose, convex with an involute margin forming a shallow depression around the stipe; surface smooth, firm jelly-like texture, viscid when moist; colour completely light brown or with a brown centre fading to pale yellow at the margin. **Stipe** central or slightly eccentric, 30 mm or more long and up to 2 mm thick, viscid when moist, tough, smooth, white to very pale yellow. **Spore Print** White

Microscopic Features

Ascospores 95–120 × 2 μm, filiform (filaments), slightly tapering, with several septa. Asci eight-spored, 160–210 × 6.5–8 μm.

Comments

Vibrissea dura is a gelatinous 'map pin'-like fungus, and is readily recognised by its pale brown globose head, whitish stipe, and the total absence of any tints of green. It is a rare fungus found in very wet forests. In New Zealand there is a similar looking species, *V. albofusca*, which has a dark brown pileus.

References

Beaton G and Weste G (1976) "Australian Discomycetes: Log-inhabiting *Vibrissea* species". *Transactions of the British Mycological Society* **Vol. 67(1), pp. 129–132** **[D I]**

Fuhrer B (2009) *A field guide to Australian fungi.* Bloomings Books: Melbourne. **p. 340** **[D CP]**

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Grey P and Grey E (2005) *Fungi down under: the Fungimap guide to Australian fungi.* Fungimap: South Yarra, Victoria. **p. 118[D CP]**

2.4 Order: Hypocreales

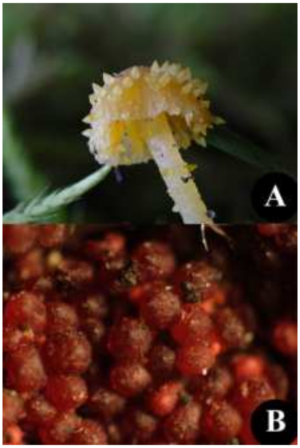
Hypocreales is an order of the class Sordariomycetes and is estimated to contain 7 families, 237 genera, and 2647 species (Kirk *et al.* 2008). Fruit-bodies are predominantly flask-like (perithecia), in which eight-spored inoperculate asci are produced. Most species have a fleshy fruit-body, and many can be recognised by their bright colours. These are often yellow, orange or red.

The taxonomy of this order is still unsettled, as the majority of species have both anamorph (asexual reproductive state) and teleomorph (sexual reproductive state) states and for a significant number of species only the teleomorph is known. To date not enough species have been sampled to resolve the taxonomy of this order.

Hypocreales
Taxonomic Classification

Kingdom: Fungi
Phylum: Ascomycota
Subphylum: Pezizomycotina
Class: Sordariomycetes
Subclass: Hypocreaomycetidae
Order: Hypocreales

Families
- Bionectriaceae
- Clavicipitaceae
- Cordycipitaceae
- Hypocreaceae
- Nectriaceae
- Niessliaceae
- Ophiocordycipitaceae



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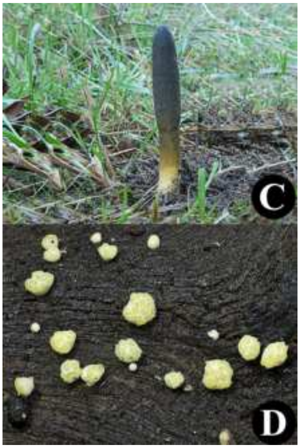
A. *Neobarya agaricicola*
B. *Nectria sanguinea*



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C. *Cordyceps gunnii*
D. *Trichoderma gelatinosum*

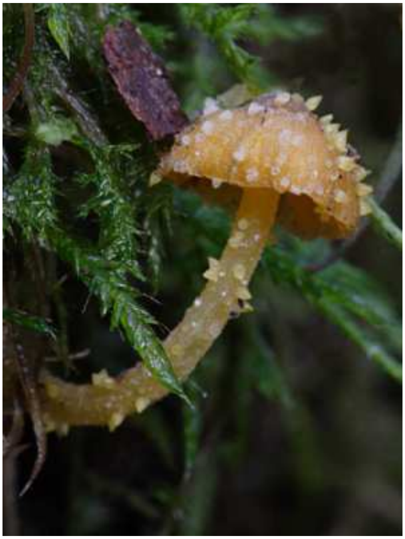
Hypocreales consist of diverse species, some of which attack hosts across three kingdoms of life, including insects, plants and other fungi. The pictures above illustrate some of the members of the Helotiales. *Neobarya agaricicoloa*, parasitic on fungi, *Nectria sanguinea* has been known to be parasitic on species in the family Xylariaceae, *Cordyceps gunnii* is parasitic on some moth larvae, and *Trichoderma gelatinosum* is saprophytic on decaying wood.

References

Kirk PM, Cannon PF, Minter DW and Stalpers JA (2008) *Ainsworth and Bisby's dictionary of the Fungi.* (10th ed.) Wallingford (UK): CAB International.

Fam. Clavicipitaceae

Neobarya agaricicola



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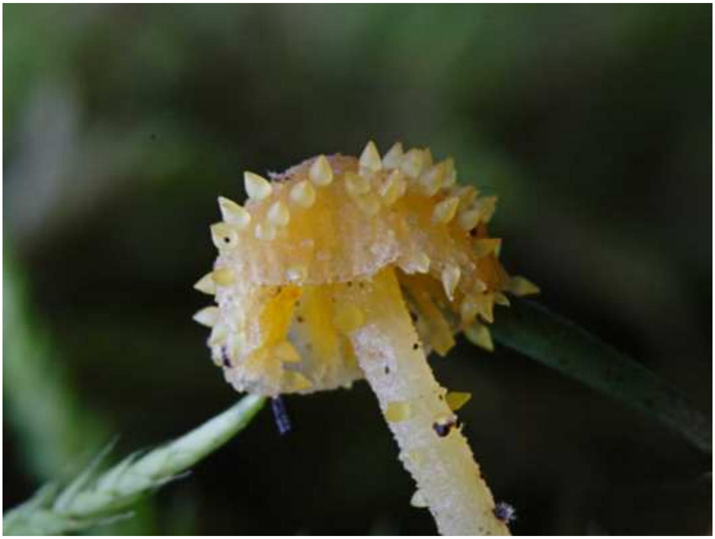

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Fam. Clavicipitaceae

Neobarya agaricicola

Biology

Parasitic ascomycete; solitary to densely gregarious on the pileus and stipe of small agarics (*Mycena* or small *Galerina*-like fruit-bodies).

Fruit-body Description

Elongated ovoid flask-shaped fruit-body up to 1 mm high, with an acute apex; smooth, yellow to yellow-orange. **Spore Print** not observed

Microscopic Features

Ascospores 140–350 × 0.5–1 μm, thread-like, full length of the ascus. Asci 140–350 × 3.5–6 μm, eight-spored; spores resemble a bundle of threads filling the ascus.

Comments

Neobarya agaricicola can easily be overlooked because of its diminutive size, but it is a highly distinctive species because of its yellowish flask-shaped fruit-body, which grows in large numbers on the small host agaric.

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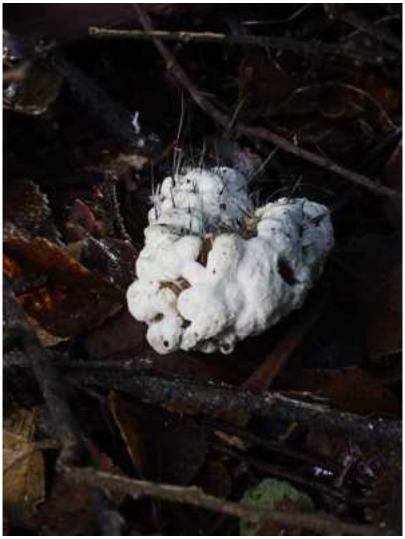
Fam. Cordycipitaceae

Cordyceps bassiana



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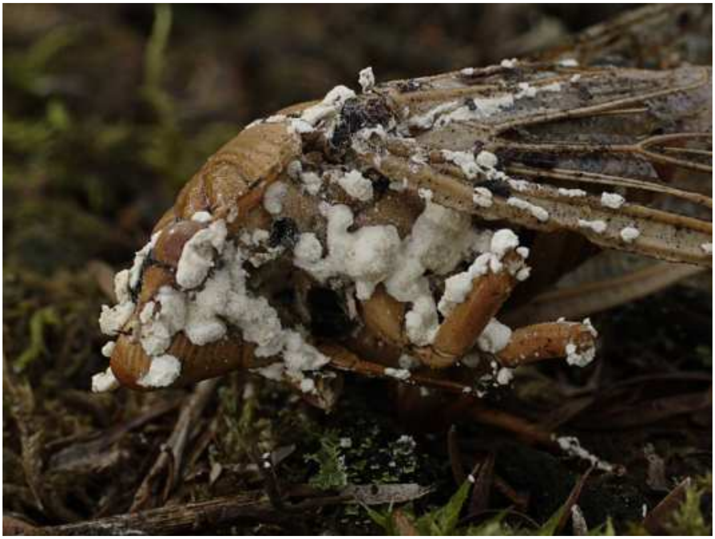

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Fam. Cordycipitaceae

Cordyceps bassiana

Beauveria bassiana

Biology

Parasitic ascomycete; the most common stage of this species is the asexual stage (anamorph), which is highly virulent and infects a wide range of insects. The sexual (teleomorph) club-like stage has been found on wood-boring grubs.

Fruit-body Description

White mycelium and conidiogenous cells encrusting the parasitised insect, giving the impression that the insect is coated in icing sugar. The sexual stage (teleomorph) has the characteristic *Cordyceps* club-like shape, is up to 40 mm long and up to 7 mm thick, brownish yellow to yellowish, and has recently been identified in China and verified using DNA analysis (Li *et al.* 2001).

Spore Print White

Microscopic Features

Conidia (asexual reproductive cells) 1.5–4 × 1.5–3 μm, globose. Ascospores 300–520 × 1–1.5 μm, filiform, equally thick throughout, multiseptate; fragmenting into secondary spores; secondary spores 4.5–10 × 1–1.5 μm. Asci 230–570 × 3.5–4 μm.

Comments

The asexual stage of this species is a highly virulent parasite attacking a broad range of insects, and since it can be readily cultured it is widely used for biological control of insects.

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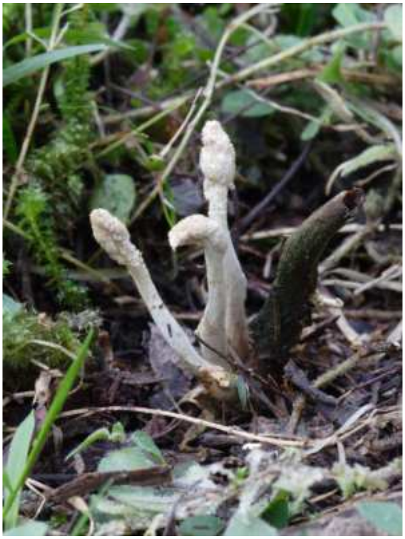
Fam. Cordycipitaceae

Cordyceps cranstounii



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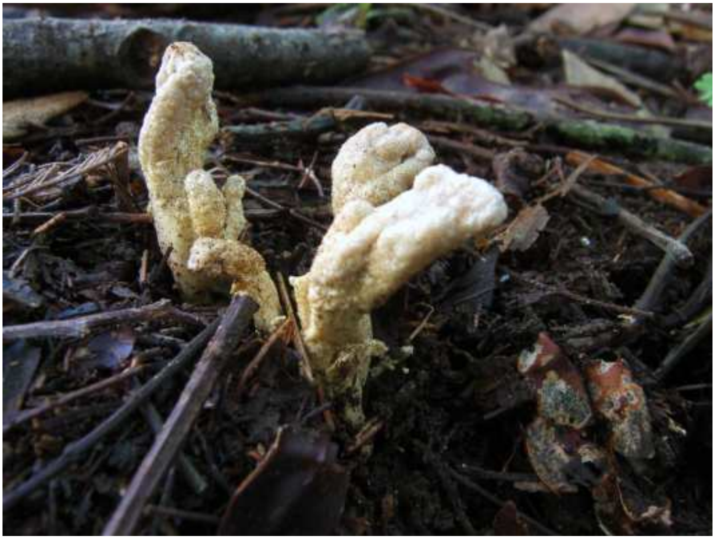

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Fam. Cordycipitaceae

Cordyceps cranstounii

Biology

Parasitic ascomycete; parasitic on buried moth larvae, usually from the family Hepialidae, and often of the genus *Oxycanus*, such as ghost or swift moths. The fruit-body emerges from a parasitised larva.

Fruit-body Description

Consists of multiple club-shaped heads, up to 30 mm tall, protruding above the ground; cream to yellowish cream in colour; the fertile region, which is thicker than the stipe, covers more than half of the above-ground club; it has a rough surface, covered with conspicuous perithecial orifices (a perithecium is a flask-shaped structure in which the asci form); the below-ground material connected to the caterpillar is branched and lace-like. **Spore Print** White

Microscopic Features

Ascospores long (greater than 200 μm), filiform, equally thick throughout, multiseptate; fragmenting into secondary spores; secondary spores 3.5 × 1.5 μm, cylindrical, smooth.

Comments

Cordyceps cranstounii is readily recognised in the field by its cluster of cream-coloured, rough, club-shaped fruit-bodies that usually reach a height of only 20 mm. Occasionally it can also be found growing on fruit-bodies of *Cordyceps robertsii*.

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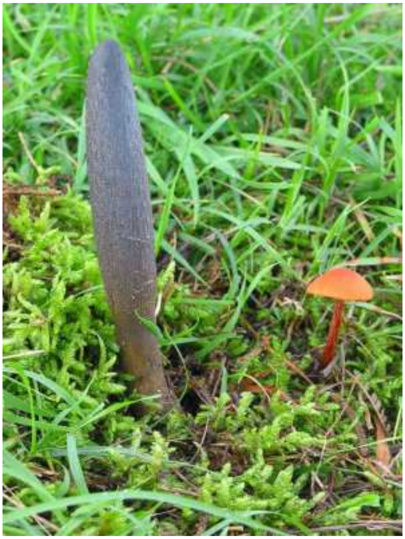
Fam. Cordycipitaceae

Cordyceps gunnii



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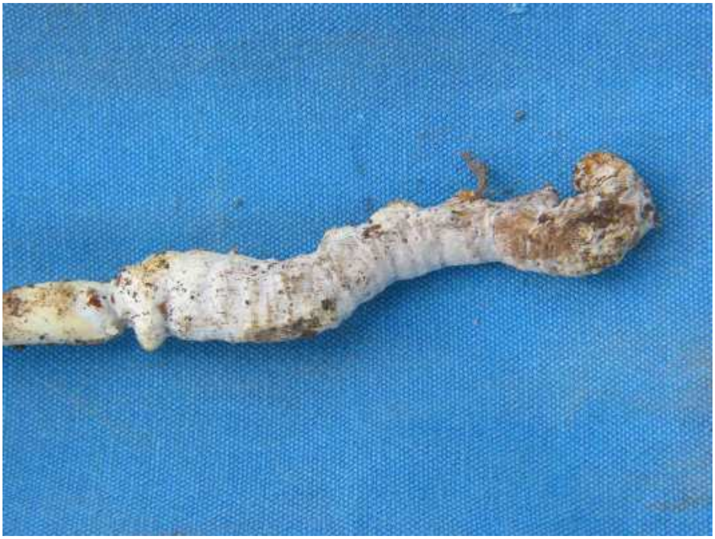

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Fam. Cordycipitaceae

Cordyceps gunnii

Biology

Parasitic ascomycete; parasitic on buried moth larvae, usually from the family Hepialidae, and often of the genus *Oxycanus*, such as ghost or swift moths. The fruit-body usually emerges from the head of a parasitised larva, and is found mostly under *Acacia* trees.

Fruit-body Description

Consists of a blunt-ended club (usually one but occasionally two) up to 120 mm above the ground and up to 30 mm thick; cylindrical; the fertile region is smooth, coloured green-black and ageing to black, covered in small perithecial orifices; the fertile region has a smooth transition to the non-fertile base, which is coloured yellowish. **Spore Print** White

Microscopic Features

Perithecia 0.4–0.5 × 1.0–1.5 mm, immersed in fruit-body, oval. Ascospores 350–450 × 1.5–2 μm, filiform, equally thick throughout, multiseptate; fragmenting into secondary spores; secondary spores 2.5–3 × 1.5–2 μm, smooth, rectangular. Asci 350–450 × 5–5.5 μm.

Comments

The large, almost black club of *Cordyceps gunnii* is usually found near wattle trees (*Acacia* spp.), because the host larvae feed on wattle tree roots. The stipe down to the larva is usually short, about 10–20 cm, but occasionally can be as long as 80 cm.

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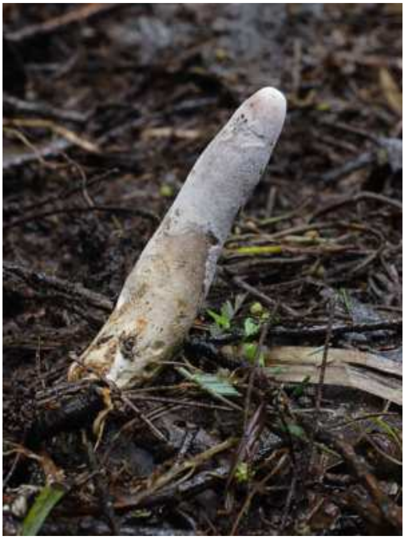
Fam. Cordycipitaceae

Cordyceps hawkesii



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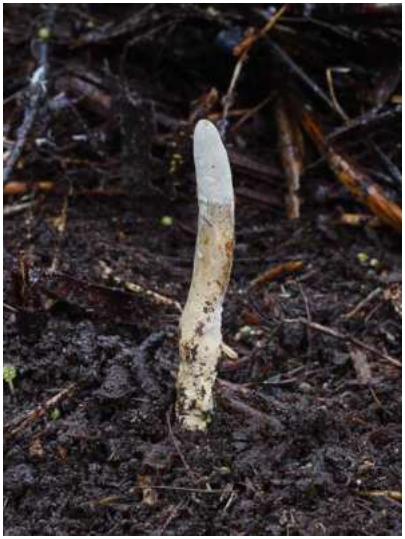

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Fam. Cordycipitaceae

Cordyceps hawkesii

Biology

Parasitic ascomycete; parasitic on buried moth larvae, usually from the family Hepialidae, and often of the genus *Oxycanus*, such as ghost or swift moths. The fruit-body usually emerges from the head of a parasitised larva, and is found mostly under wattle trees (*Acacia* spp).

Fruit-body Description

Consists of a blunt-ended club (usually one but occasionally two) up to 80 mm above the ground and up to 30 mm thick; cylindrical; the fertile region is smooth, coloured creamy brown, covered in small perithecial orifices; there is a sharp transition from the fertile region to the non-fertile base, coloured pale fawn. **Spore Print** White

Microscopic Features

Ascospores long (greater than 200 μm), filiform, equally thick throughout, multiseptate; fragmenting into secondary spores; secondary spores 4×2 μm, cylindrical, smooth.

Comments

The large pale fawn club of *Cordyceps hawkesii* is usually found near *Acacia* trees, because the host larvae feed on the roots of these trees. The stipe down to the larva is usually short, about 10–20 cm, but occasionally can be much longer. DNA analysis done by Liu *et al.* (2002) shows that *C. hawkesii* and *C. gunnii* could be morphological variants of the same species, but no Australian material was tested.

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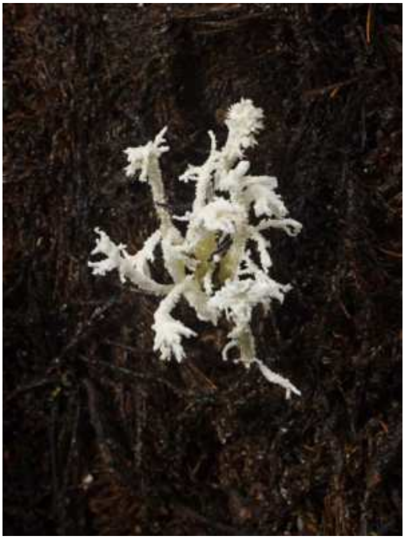
Fam. Cordycipitaceae

Cordyceps takaomontana



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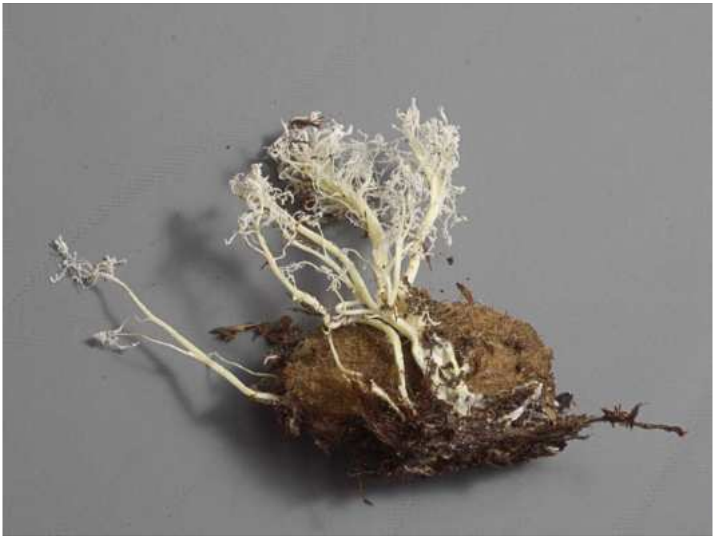

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Fam. Cordycipitaceae

Cordyceps takaomontana

Paecilomyces tenuipes *Isaria tenuipes*
Isaria japonica

Biology

Parasitic ascomycete; the most common stage of this species is the asexual stage (anamorph); the sexual (teleomorph) club-like stage is rare. It predominantly infects the pupae of Lepidoptera (moth and butterfly) larvae.

Fruit-body Description

Anamorph

Typically consists of a number of caespitose stipes, either branched or simple, up to 50 mm long and 3 mm thick, and covered with a feathery deposit consisting of conidial spores; colour of stipes is pale yellow and the conidial spore mass is white. The infecting mycelia do not cover the outside of the host as is the case with *Cordyceps bassiana*.

Teleomorph

Fruit-body solitary or forming a group of 2 to 8 caespitose cylindrical or clavate clubs up to 40 mm tall and 3 mm thick; surface slightly rough; colour pallid yellow to orange buff. **Spore Print** White

Microscopic Features

Conidia (asexual reproductive cells) 4–5.5 × 1.5–2.5 μm, elongate ellipsoidal to slightly irregularly sausage-shaped. Ascospores filamentous, secondary spores 3.5–7 × 0.5–1 μm. Asci 360 × 3.5–4.5 μm.

Comments

Cordyceps takaomontana is most easily recognised in its more common anamorph form, with its yellowish stipes covered in a white feathery structure. The teleomorph form of this species is not so easily recognisable as there are a small number of other species of *Cordyceps* that also have yellowish clubs. To be sure of identification the host pupa needs to be identified. In Australia the teleomorph form of this species is extremely rare. By the 1940s the anamorph *Isaria japonica* and the teleomorph *Cordyceps takaomontana* forms of this species were understood to be the same species. This relationship was eventually proven by Luangsa-ard *et al.* (2005) using DNA analysis.

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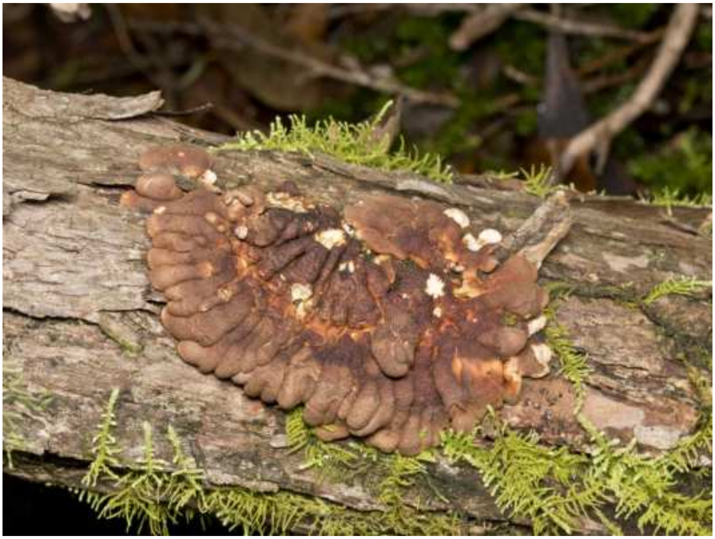
Fam. Hypocreaceae

Hypocreopsis amplectens



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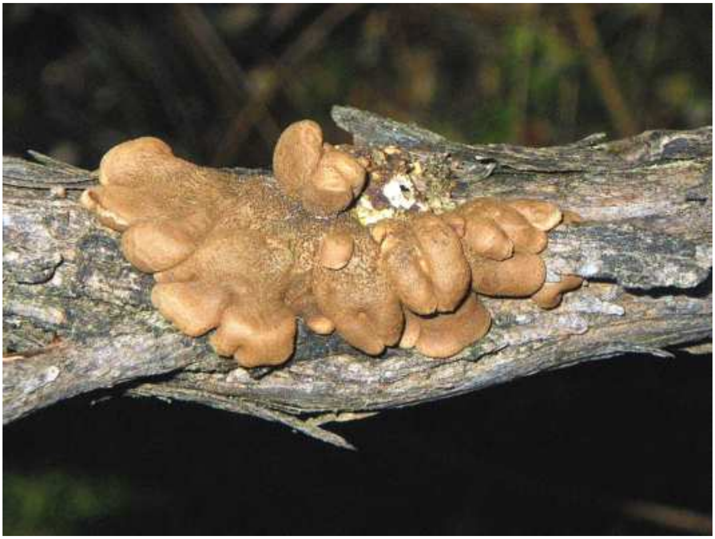

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Fam. Hypocreaceae

Hypocreopsis amplectens

Biology

Parasitic ascomycete; found growing on fruit-bodies of *Hymenochaete* species, a brown crust fungus, on dead wood of Heath Tea-tree *Leptospermum myrsinoides*, Prickly Teatree *L. continentale*, Burgan *Kunzea leptospermoides*, Silver Banksia *Banksia marginata*, and Scented Paperbark *Melaleuca squarrosa*.

Fruit-body Description

Up to 60 mm or more across, more or less circular in outline, consisting of finger-like lobes radiating from a common centre, giving the impression of grasping fingers; surface slightly rough, due to raised ostiolar openings; colour tobacco-brown to sooty brown, outer edges pale brown to yellowish. **Flesh** white, firm in texture. **Spore Print** Light brown

Microscopic Features

Ascospores (20–)33 – 52 (–112) × 9–13 μm, cylindrical, sometimes tapering to rounded ends, coarsely warted. Asci (2–)3–4 spored, 135–190 × 10.5–13 μm.

Comments

Hypocreopsis amplectens is usually found in association with *Hymenochaete* species on dead branches of Heath Tea-tree, Prickly Tea-tree, Burgan, Silver Banksia, and Scented Paperbark. It is readily recognised by its brown colour and finger-like lobes radiating from a central location. There is no other fungus with which it can be easily confused. This species has been collected in only a few locations in Australia and once in New Zealand, making it a rare and threatened species. In Australia, it has been classified as “vulnerable” under the Victorian *Flora and Fauna Guarantee Act 1988*.

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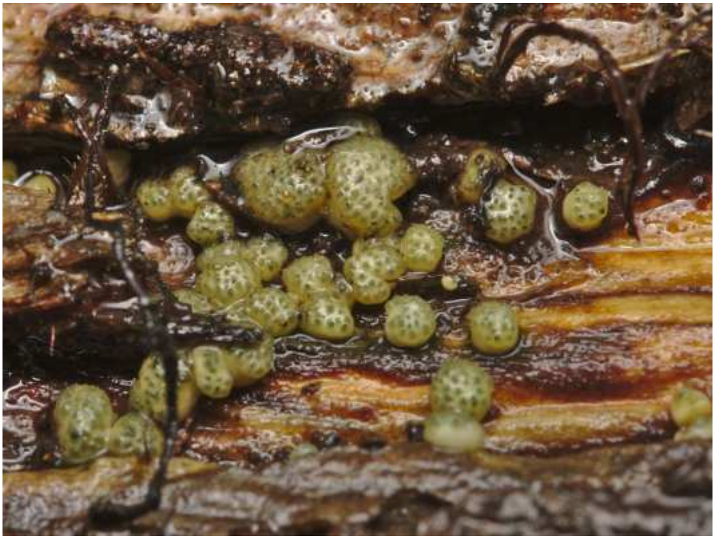
Fam. Hypocreaceae

Trichoderma aff. *gelatinosum*



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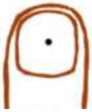

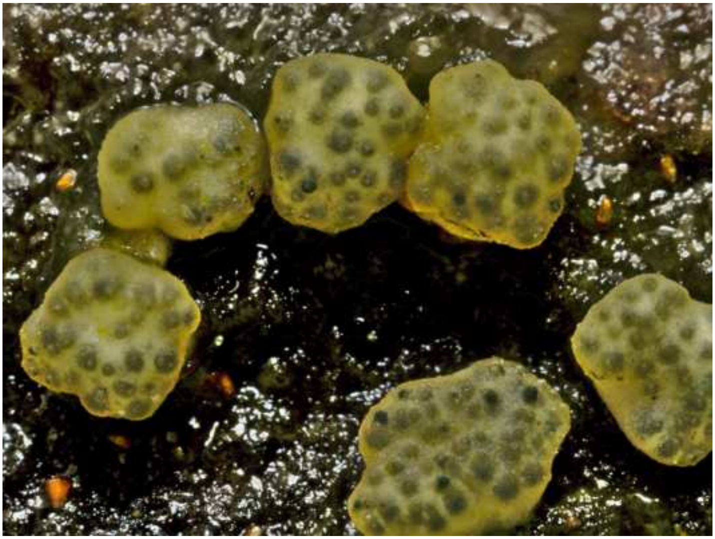

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Fam. Hypocreaceae

Trichoderma aff. *gelatinosum*

Hypocrea aff. *gelatinosa* (Teleomorph)

Biology

Saprotrophic and parasitic (on other fungi) ascomycete; small cushion-like fruit-bodies may be scattered, gregarious or aggregated into small clusters on damp to wet wood, usually in wet forests.

Fruit-body Description

Teleomorph (the sexual stage) fresh fruit-bodies 0.3–2 mm diameter, 0.3 to 1 mm thick, scattered, gregarious or aggregated into small clusters; when young button-shaped or cylindrical, becoming pulvinate (cushion-like) when mature. Surface when dry, smooth, dull not shiny, when young showing faint darker yellowish green ostiolar dots, which become well-defined ostiolar mounds with dots darkening to a dark green as spores mature. Colour when young pale yellow, becoming greenish yellow, eventually becoming dark yellowish green, and when fully mature and dry, becoming very dark greenish brown to almost black.

Anamorph (the asexual stage) this reproductive stage has not been observed.

Spore Print Dark green

Microscopic Features

Initially the asci contain eight bicellular ascospores in uniseriate (in a single line) arrangement. As the ascospores mature they split within the ascus into two populations of ascospore cells, the cell closest to the ascus apex is the upper (= distal) cell, and the cell below it is the proximal cell. This splitting process produces an ascus with sixteen spores.

Ascospores upper (distal) cell 4.5–6.5 × 4.5–6.5 μm (mean $5.5 \pm 0.5 \times 5.5 \pm 0.3$ μm, Q=1.01 ± 0.1, n=30), globose to subglobose, warty (verrucose); lower (proximal) cell 5–8 × 4.5–6 μm (mean $6.5 \pm 0.8 \times 5.0 \pm 0.3$ μm, Q=1.30 ± 0.17, n=30), globose, subglobose, ellipsoidal or wedge-shaped, warty (verrucose). Asci sixteen-spored, 87–130 × 5.5–7 μm, cylindrical; spores unisriate.

Comments

The teleomorph of this wood-inhabiting species is recognised by its yellow to greenish yellow cushion-like fruit-bodies that are dotted with dark green spore-bearing structures. Based on morphology of the teleomorph this species has sometimes been referred to as *Hypocrea gelatinosa*, a European species with a similar greenish fruit-body that develops orange to brick-red background colours on maturing, which *Trichoderma* aff. *gelatinosum* does not do. *Hypocrea* *gelatinosa* is a synonym for *Trichoderma gelatinosum* (Bissett *et al.* 2015). There are a number of European *Trichoderma* species that have green spores and yellow green to green fruit-bodies, such as *T. aerugineum*, *T. harzianum*, *T. sinuosum* and *T. thelephoricola*(Jaklitsch 2009), plus there are other similarly coloured species endemic to other regions. Trying to identify a *Trichoderma* species only by the morphology of its teleomorph is very difficult, as it is the anamorph that contains much of the identifying parameters. In Australia this genus has been understudied and it is most likely that this species has not been described.

Trichoderma is a genus of fungi that displays a remarkable range of lifestyles and interactions with other fungi, animals and plants. They have the ability to discourage plant-pathogenic fungi, and stimulate plant defense responses and growth. Advances in molecular genomics and ecology indicate that the complex interactions *Trichoderma* species have with elements of their environment may have evolved as a result of saprotrophy on fungal biomass and other forms of parasitism on other fungi, combined with environmental opportunism.(Druzhinina et al. 2011).

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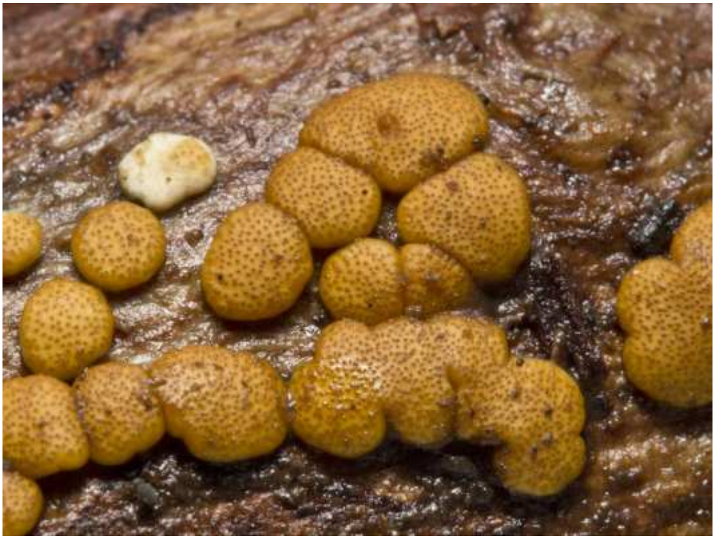
D=Description; **I**=Illustration; **CI**=Colour Illustration; **P**=Photo; **CP**=Colour Photo

Fam. Hypocreaceae

Trichoderma nothescens



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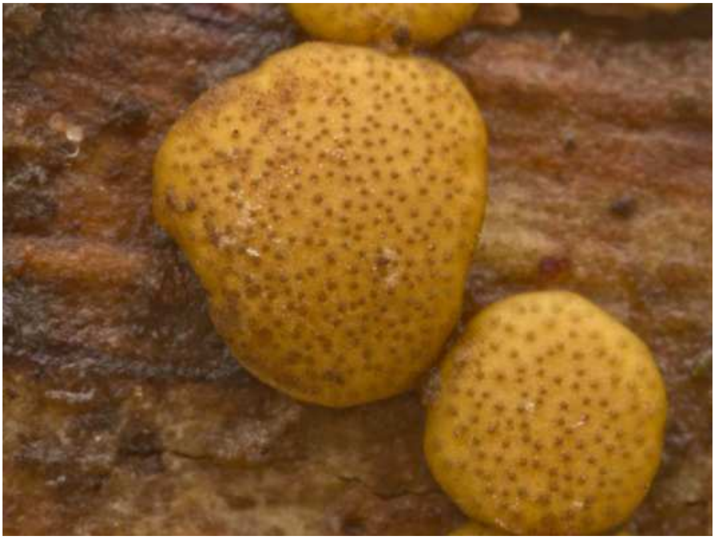

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Fam. Hypocreaceae

Trichoderma nothescens

Biology

Saprotrophic and weak parasitic ascomycete; solitary or gregarious, on the bark of dead hardwood, usually associated with other fungi.

Fruit-body Description

Teleomorph (the sexual stage) up to 4 mm diameter hemispherical cushions, either scattered, gregarious, or crowded, beginning as whitish furry lumps, then turning into smooth pale brown fruit-bodies often with a pale to white margin, becoming darker brown with age; surface peppered with ostioles (darker non-papillate spots) from embedded perithecia. **Perithecia** fully immersed in the fruit-body.

Anamorph (the asexual stage) has been seen only in culture as a furry green mould. **Spore Print** Not observed

Microscopic Features

Ascospores (part-spores) 4.5–6.5 × 3.5–5 μm, (mean $5.3 \pm 0.6 \times 4.3 \pm 0.5$ μm, n=30); two distinct shapes, globose to subglobose, and truncated-conical with rounded ends; spinulose and hyaline. Asci 75–105 × 4–6.5 μm, cylindrical, 16-spored; spores uniseriate (in a single line). Paraphyses not observed.

Comments

In Australia this species has often been misidentified as *Hypocrea rufa*, but the work done by Jaklitsch *et al.* (2006) showed that this species belongs to the *Hypocrea/Trichoderma viridescens* complex of species. Further research (Jaklitsch *et al.* 2013) using DNA analysis has disentangled this complex of species, and the results show that *T. nothescens* is a new southern hemisphere species found in Australia (so far only in Victoria). It is possible that its range may extend from New South Wales to Tasmania. Making positive field identification of members of this species complex is virtually impossible because their morphologies overlap.

Before 2011 these species were placed into 2 genera, the asexual morph (anamorph) was placed in the genus *Trichoderma* Pers. 1794 and the sexual morph (teleomorph) was placed in the genus *Hypocrea* Fr. 1825. The 18th International Botanical Congress (IBC) held in Melbourne, in July 2011, passed a ruling that one species can have only one name. As *Trichoderma/Hypocrea* are different forms of the same species, to satisfy the IBC rules both the sexual and asexual forms are placed in the genus *Trichoderma*, which has priority by being the earlier named genus.

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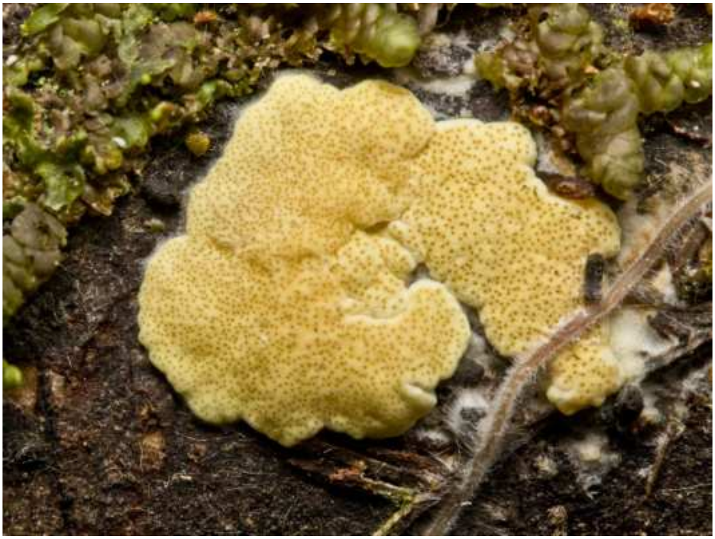
Fam. Hypocreaceae

Trichoderma victoriense



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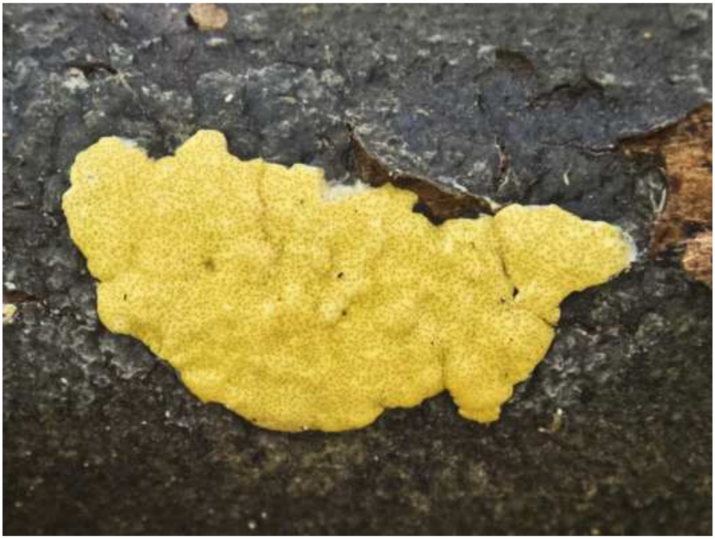

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Fam. Hypocreaceae

Trichoderma victoriense

Hypocrea victoriensis

Biology

Saprotrophic or possibly fungicolous ascomycete; fruit-body forms an adhering crust, typically found on decorticated dead wood.

Fruit-body Description

Effuse (flat), crust-like covering forming irregular patches up to 30 mm × 15 mm or more and up to 0.5 mm thick, punctate (with small projections) with ostioles, ostiole openings visible; colour variable, typically lemon yellow to ochraceous. **Chemical test** application of KOH solution produces a weak orange colour reaction. **Spore Print** White

Microscopic Features

Ascospores (part-spores) 5.5–7 × 4.5–5.5 μm, thick-walled, subglobose, distinctly spinulose. Asci 112–142 × 6–7 μm, 16-spored; spores uniseriate (in a single line).

Comments

Patches of *Trichoderma victoriense* are readily identified by their bright lemon yellow colour and clearly visible ostioles. In Australia, this species was originally identified as *H. sulphurea*, a northern hemisphere species that is morphologically very similar to the Australian species. DNA analysis (Overton *et al.* 2006) has shown that the Australian species is genetically a separate and distinct species.

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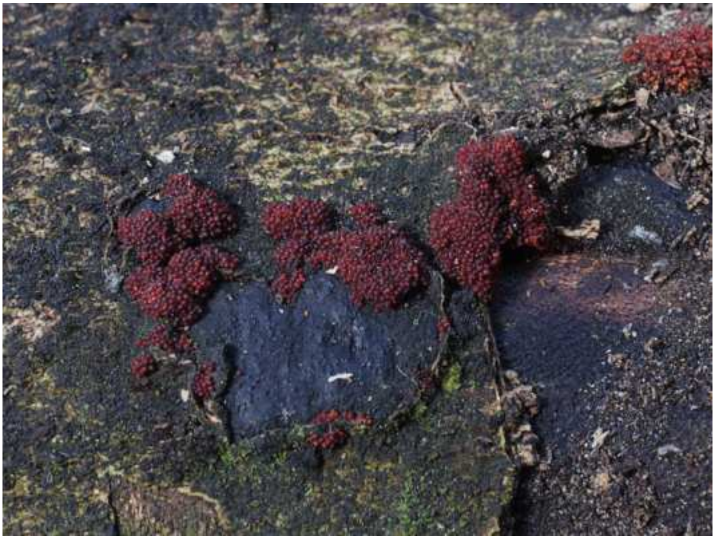
Fam. Nectriaceae

Nectria sanguinea



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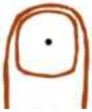

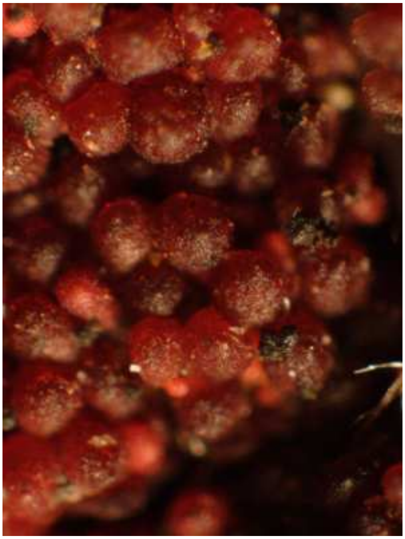

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Fam. Nectriaceae

Nectria sanguinea

Sphaeria sanguinea *Nectria episphaeria*

Biology

Parasitic ascomycete; usually found as gregarious colonies on one of the crust fungi belonging to genera in the Xylariaceae, particularly *Hypoxylon* and *Biscogniauxia*.

Fruit-body Description

Flask-shaped fruit-bodies (perithecia) up to 0.5 mm high, globose, ovoid or pyriform, ostiole (opening of spore-producing chamber) distinctly papillate; surface finely dimpled; colour scarlet or dark red. **Spore Print** White

Microscopic Features

Ascospores 6–14 × 3–5 μm oval, warty, with one septum. Asci eight-spored, 48–95 × 5–6 μm, spores in line (uniseriate).

Comments

Nectria sanguinea fruit-bodies are recognised by their small size, flask shape, the distinctly papillate ostiole, and their growth on or next to a black crust fungus. There are a number of similar red *Nectria* species, although most of them are slightly larger, usually more than 1 mm in height. Microscopic examination is required to ascertain their identity.

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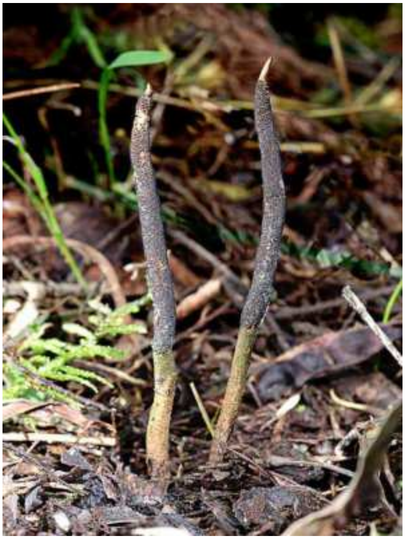
D=Description; **I**=Illustration; **CI**=Colour Illustration; **P**=Photo; **CP**=Colour Photo

Fam. Ophiocordycipitaceae

Ophiocordyceps robertsii



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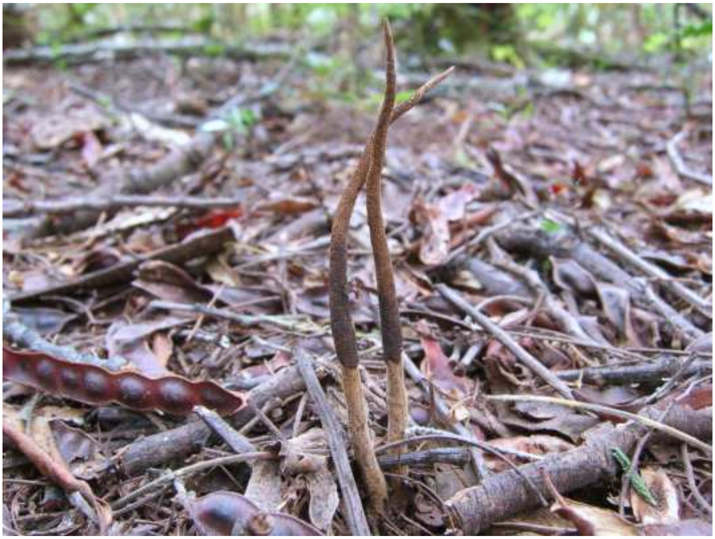

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Fam. Ophiocordycipitaceae

Ophiocordyceps robertsii

Cordyceps robertsii

Biology

Parasitic ascomycete; parasitic on buried moth larvae, usually from the family Hepialidae, and often of the genus *Oxycanus*, such as ghost or swift moths. The fruit-body usually emerges from the head of a parasitised larva, and is found mostly under wattle trees (*Acacia* spp.).

Fruit-body Description

Slender, up to 380 mm long, single or slightly branched (2–3); fertile portion top third to a half of the fruit-body, 3–4 mm thick; pointed, surface rough due to a dense covering of perithecia, which reach apex of stem; colour initially brown, becoming a brown-black with age; sterile portion more slender, 2–3 mm thick; same colour as fertile portion. **Spore Print** White

Microscopic Features

Perithecia 0.3–0.4 × 0.6–0.88 mm, superficial (on the surface), easily separable, ellipsoidal. Ascospores 250–380 × 1.5–2 μm, filiform, equally thick throughout, multiseptate; fragmenting into secondary spores; secondary spores 6–12 × 1–1.5 μm, smooth, rectangular. Asci 250–420 × 10–14 μm.

Comments

Ophiocordyceps robertsii is one of the largest, if not the largest *Cordyceps* species in the world. The long slender pointed fruit-body makes it readily identifiable. Occasionally specimens are found with whitish or cream-coloured outgrowths. These outgrowths have been identified as belonging to *Cordyceps cranstounii*, which may be parasitic on or co-existing with *O. robertsii*. Phylogenetic analysis of the family Clavicipitaceae clearly shows that this family was not monophyletic and needed to be reclassified. This was achieved largely by the Sung *et al.* (2007a) and Sung *et al.* (2007b). It can be inferred from this reclassification that morphological characteristics are not diagnostic of monophyly.

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2.5 Order: Pezizales

Pezizales is the only order of the class Pezizomycetes, and is estimated to contain 16 families, 199 genera, and 1683 species (Kirk *et al.* 2008). Most Pezizales form cup-shaped fruit-bodies (apothecia), and have a hymenium in which nominally eight-spored operculate asci are produced. They are found mostly on soil, dung, wood or plant debris. The trophic (feeding habit) status of species ranges from saprobic to mycorrhizal, with a few known to be parasitic. A number soil-inhabiting species have developed truffle-like closed hypogeous fruit-bodies in parallel with the loss of forcibly discharged ascospores (Hansen and Pfister 2006; Tedersoo *et al.* 2006).

The "true truffles" once belonged to the now obsolete Order Tuberales, but phylogenetic analysis of their DNA clearly shows that they belong in the Order Pezizales (Læssøe and Hansen 2007). The family Tuberaceae has at least 111 described species (Kirk *et al.* 2008). In this family you will find such "gastronomic treasures" as *Tuber melanosporum* (black truffle) and *Tuber magnatum* (white truffle).

Pezizales
Taxonomic Classification

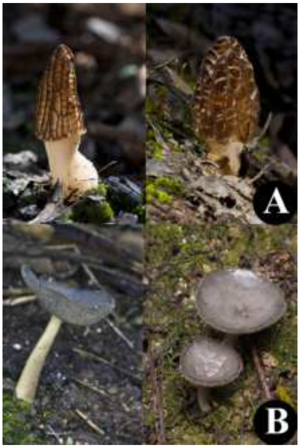
Kingdom:	Fungi
Phylum:	Ascomycota
Subphylum:	Pezizomycotina
Class:	Pezizomycetes
Order:	Pezizales

Families

Ascobolaceae
Ascodesmidaceae
Caloscyphaceae
Carbomycetaceae
Chorioactidaceae
Discinaceae
Glaziellaceae
Helvellaceae
Karstenellaceae
Morchellaceae
Pezizaceae
Pyronemataceae
Rhizinaceae
Sarcoscyphaceae
Sarcosomataceae
Tuberaceae

Another group of species that are highly prized are the morels, in the family Morchellaceae. These sought-after species are *M. esculenta* (yellow or common morel), *M. deliciosa* (white morel) and *M. elata* (black morel). Morels have not been successfully cultivated on a large scale; the commercial morel industry is based largely on specimens collected from nature. It has also been noted that morels often occur abundantly in the two to three years following a forest fire.

Below are some images of Pezizales that can be found in Australia, such as the stiped species *Morchella australiana* and *Helvella fibrosa*. The more common cup-shaped species are *Peziza thozetii* and *Scutellinia scutellata*.



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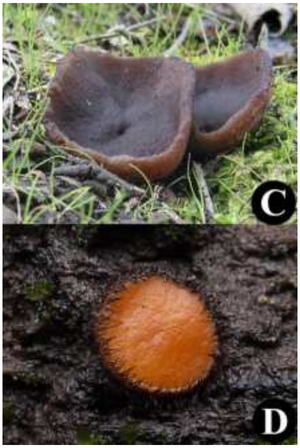
A. *Morchella australiana*
B. *Helvella fibrosa*



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C. *Peziza thozetii*
D. *Scutellina scutellata*

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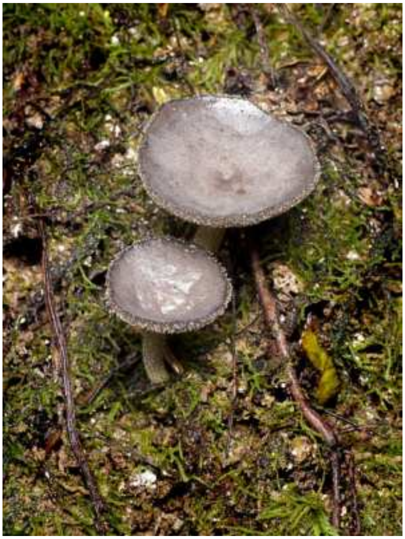
Fam. Helvellaceae

Helvella fibrosa



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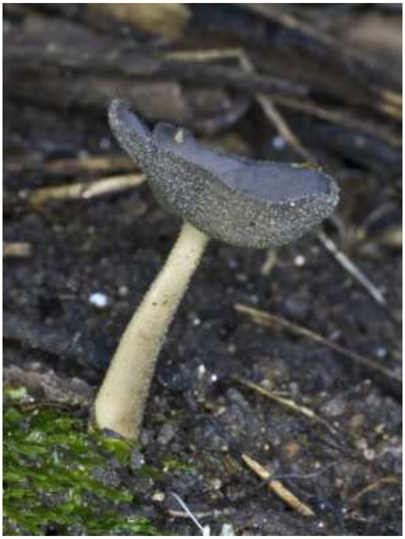

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Fam. Helvellaceae

Helvella fibrosa

Helvella chinensis *Octospora villosa*
Helvella villosa

Biology

Saprotrophic or possibly mycorrhizal ascomycete; solitary or in scattered small groups on the ground.

Fruit-body Description

Height up to 60 mm, stipitate (with a stipe or stalk) cup; **Cup** diameter up to 25 mm, shallow cup- to saucer-shaped, sometimes with a deflexed margin and hence may appear saddle-shaped. **Inner Surface** spore-bearing, smooth, grey-brown; **Outer Surface** hairy, pubescent, grey-brown. **Stipe** central, up to 50 mm long and 4 mm thick, surface same as outer surface of cup, colour a little lighter. **Spore Print** White

Microscopic Features

Ascospores 17–19.5 × 11–13 μm, short oblong ellipsoidal, when young often ornamented with warts. Asci eight-spored, 275–360 × 14–17 μm. Paraphyses slender, 2–4 μm, diameter, distinctly enlarged at the apex 6–10μm.

Comments

Helvella fibrosa is readily recognised; in Australia, a grey-brown stipitate cup is unique and cannot be readily mistaken for another fungus. The article by Korf (2008) outlines the historical name changes it has had and how it received its present name *Helvella fibrosa*.

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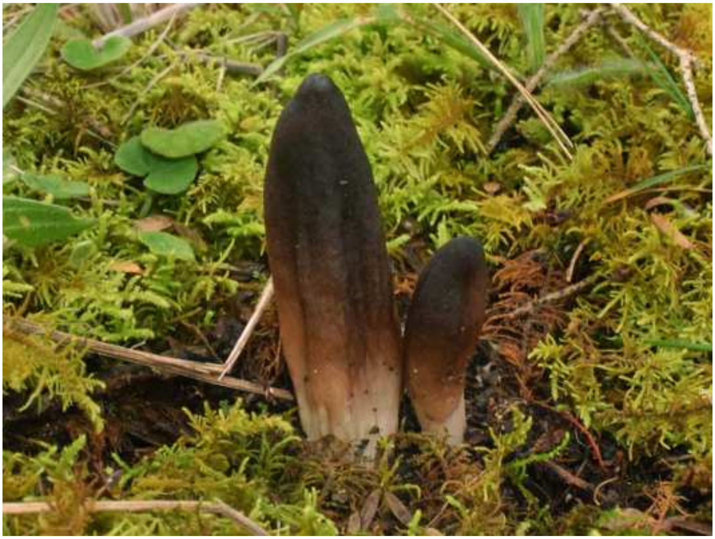
Fam. Helvellaceae

Underwoodia beatonii



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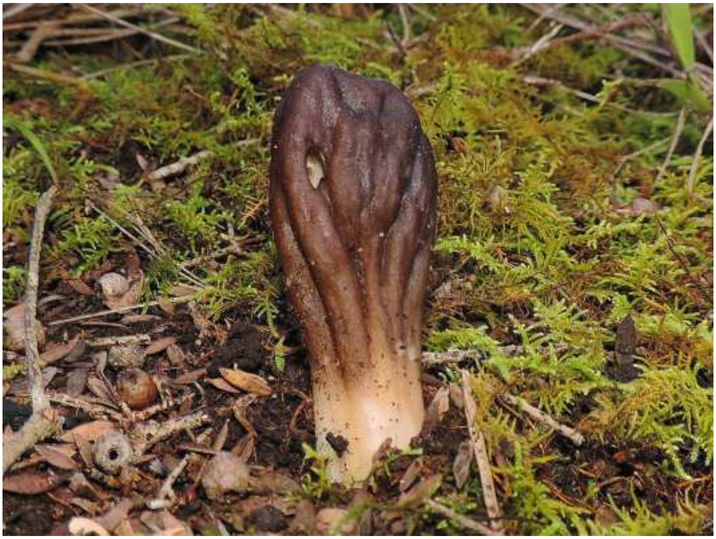

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Fam. Helvellaceae

Underwoodia beatonii

Helvella beatonii

Biology

Saprotrophic or possibly mycorrhizal ascomycete; solitary or scattered in small groups, gregarious, or occasionally fused together, on the ground usually in sandy areas, in association with eucalypts, sheoaks, and melaleucas.

Fruit-body Description

Height up to 70 mm or more, diameter about 10 mm, club-shaped; may vary from smooth and rounded to irregularly furrowed; internally filled with large longitudinal cavities. The upper portion of the fruit-body is readily differentiated from the stipe, and is covered with the **hymenium** (spore-bearing surface), which is smooth or undulate; colour brown to grey-brown, becoming blackish with age. **Stipe**, sterile, often fluted, surface minutely downy, pale creamy-white. **Spore Print** White

Microscopic Features

Ascospores 22.5–25.5 × 10.5–12.5 μm, ellipsoidal, at maturity ornamented with small warts. Asci eight-spored, 320–400 × 16–20 μm. Paraphyses slender, 2–4 μm, diameter, distinctly enlarged at the apex 5–7μm.

Comments

This species is readily recognised by its brown to almost black, well formed club-shaped fruit-body, and the clear separation between the hymenium and the whitish sterile base (stipe). Another important diagnostic feature is the presence of hollow longitudinal chambers within the fruit-body. The genus *Underwoodia* is very closely related to the genus *Helvella*, and for a while *Underwoodia* species were moved into the genus *Helvella*. Phylogenetic studies by Landeros *et al.* (2015) clearly show that *Underwoodia* is a well defined independent genus. This species was named after the mycologist Gordon Beaton, who found it at Anglesea, Victoria, in 1964.

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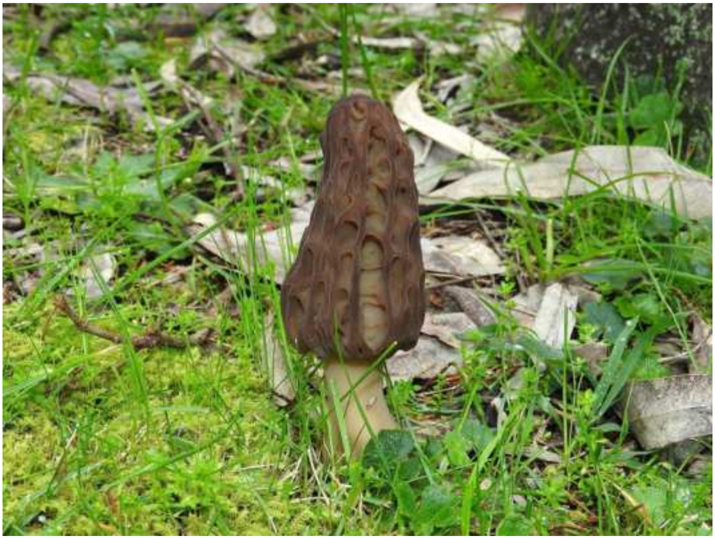
Fam. Morchellaceae

Morchella australiana



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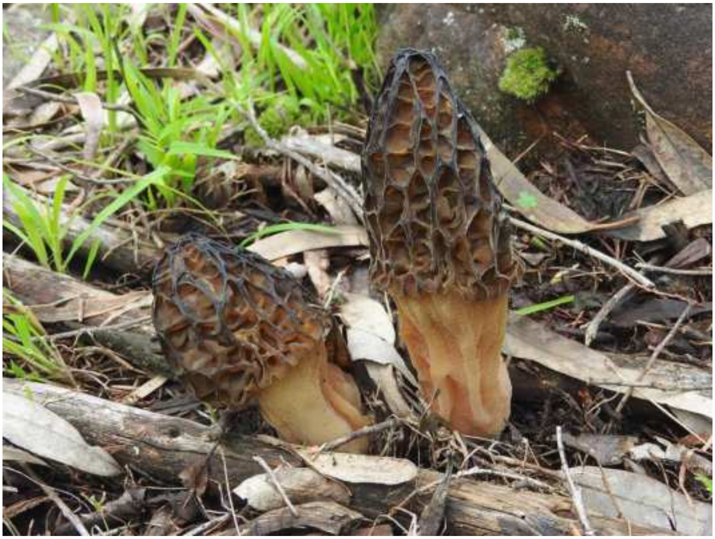

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Fam. Morchellaceae

Morchella australiana

Biology

Saprotrophic and mycorrhizal ascomycete; on unburnt sites, solitary or gregarious on the ground, in association with *Eucalyptus* and native pine *Callitris* species.

Fruit-body Description

Up to 100 mm or more tall, hollow, junction between fertile head and stipe well defined. **Fertile head** length up to 50 mm or more and 30 mm broad at the base; conical to elongated ovoid; pitted and ridged, with the pits primarily arranged vertically; the colour of the ridges ranges from dark brown to black; the colour of the pits can range from yellow to smoky yellow-brown. **Stipe** up to 60 mm or more long and 20 mm or more thick; often irregular in shape, nearly smooth to coarsely wrinkled; surface appearing to be covered in fine granules; colour whitish to light orange-yellow with age. **Spore Print** Cream

Microscopic Features

Ascospores 19–25 × 13–15 μm, ellipsoidal, smooth, hyaline, without oil guttules but occasionally with small oil globules around the external perimeter. Asci eight-spored, 140–165 × 17–29 μm. Paraphyses not exceeding the asci length, cylindrical, septate, with inflated apices.

Comments

Morchella australiana (Elliott *et al.* 2014), is an Australian native member of the *M. elata* group. A common feature of these species is the presence of prominent vertical ridges on the fertile head of the fruit-body. It is possible to confuse *M. australiana* with some introduced species, such as *M. rufobrunnea* and *M. septimelata*. It is not easy to separate the introduced species from *M. australiana* purely on morphological field characteristics, but introduced species prefer to fruit after fire, whereas *M. australiana* prefers to fruit in areas that have not been burnt. Separating *Morchella* species based on morphology has proved to be very challenging, resulting in a number of inappropriately named species. This in turn resulted in the assumption that many of the species were cosmopolitan. With the application of molecular phylogenetics, by about 2014 the *Morchella* genus had undergone extensive revision. It has also become evident that *Morchella* species generally are not cosmopolitan but instead exhibit a high degree of continental endemism (O'Donnell *et al.* 2011; Du *et al.* 2012, 2015; Richard *et al.* 2015) However, a small number of species have a cosmopolitan distribution. The reason for this is unknown, but it is possible that the spread may be the result of accidental human introductions.

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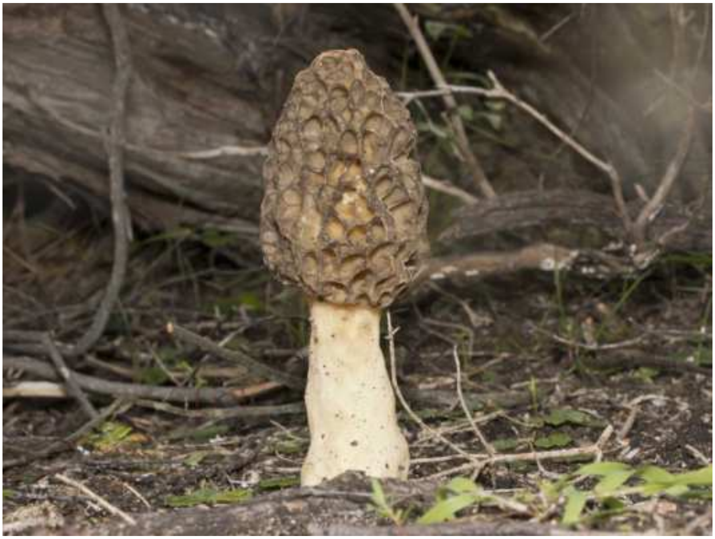
Fam. Morchellaceae

Morchella esculenta group



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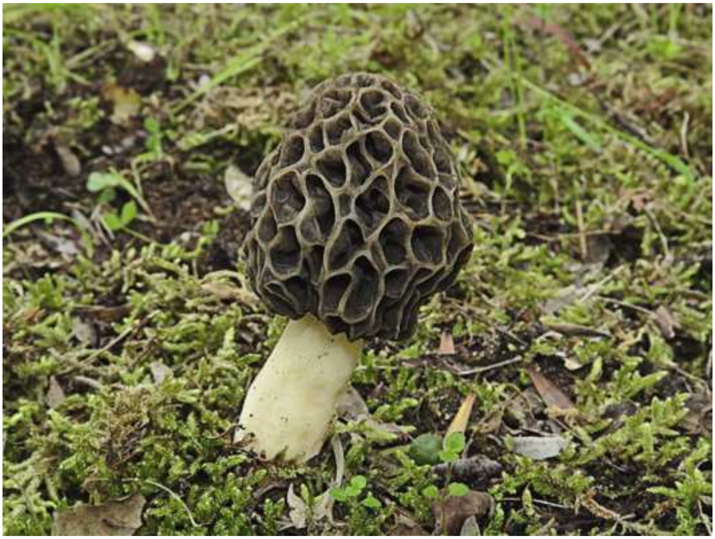

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Fam. Morchellaceae

Morchella esculenta group

Biology

Saprotrophic and mycorrhizal ascomycete; solitary or gregarious on the ground, usually amongst tea tree *Leptospermum* and *Eucalyptus* species.

Fruit-body Description

Up to 120 mm or more tall, hollow, junction between fertile head and stipe well defined. **Fertile head** length up to 50 mm or more and 45 mm across; sub-conical, ovoid or subglobose with an irregular network of ridges and pits; the colour of the ridges is usually concolorous with the pits, but with age may become darker; the colour of the pits can range from light brown to dark greyish brown. **Stipe** up to 70 mm or more long and 20 mm or more thick; often irregular in shape, nearly smooth to coarsely wrinkled; surface appearing to be covered in fine granules; colour whitish to light orange-yellow with age. The base of the stipe is attached to a sclerotium (a dense mass of hyphae and soil). **Spore Print** Cream

Microscopic Features

Ascospores 21.5–26 × 13–16.5 μm (mean 23.7 ± 1.4 × 14.8 ± 1.2 μm, n=30), ellipsoidal, smooth, without oil guttules but occasionally with numerous small oil globules around the external perimeter. Asci eight-spored, 320–380 × 20–25 μm. Paraphyses are approximately the length of the asci, cylindrical, multiseptate, moderately branched, diameter 6-10 μm; apices inflated, diameter 15–25 μm.

Comments

The ovoid to subglobose shape of the fertile head, with its irregular network of ridges and pits that lack any vertical ribs, is characteristic of species in the *Morchella esculenta* group (Du *et al.* 2015). *Morchella esculenta* is a European species (Richard *et al.* 2015; Breitenbach *et al.* 1984). The *M. esculenta* described in Breitenbach *et al.* (1984) is normally much paler and yellower, and the spore size (18–23 × 11–14 μm) is slightly smaller than in this species of *Morchella*. Furthermore, the shape of the paraphyses is different. In Breitenbach *et al.* (1984) the paraphyses have significant branching, and lack any significant swelling of the apices. By contrast, this species has only slight branching in the paraphyses and has significant swelling of the apices. These differences in morphology, plus the fact that *Morchella* species exhibit a high degree of continental endemism (see comments for *M. australiana*), mean it is possible that this is an unnamed local species belonging to the *M. esculenta* group.

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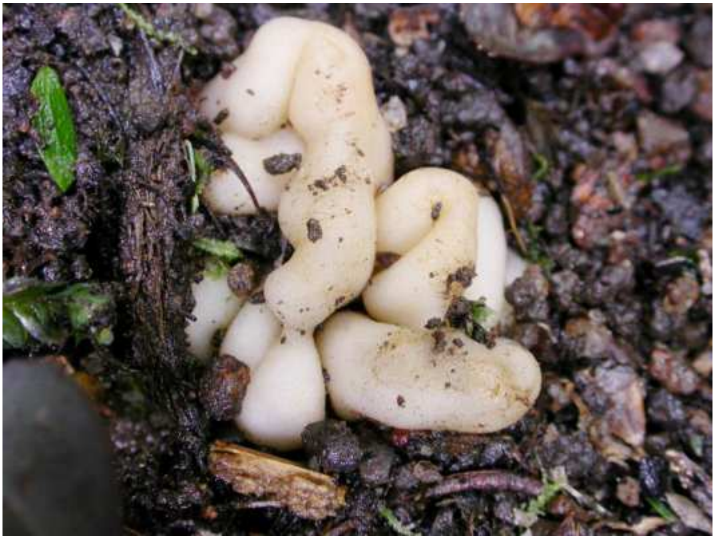
Fam. Pezizaceae

Hydnoplicata convoluta



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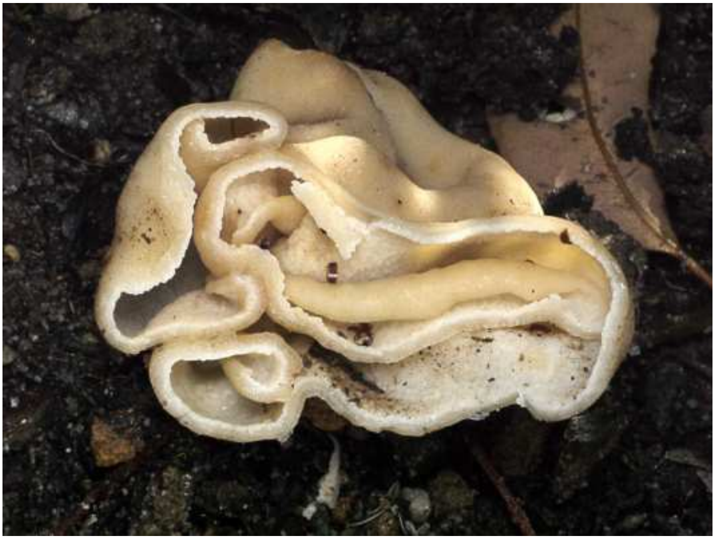

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Fam. Pezizaceae

Hydnoplicata convoluta

Peziza whitei *Hydnoplicata whitei*

Biology

Saprotrophic ascomycete; usually solitary or gregarious on soil, usually buried or partially buried (sequestrate).

Fruit-body Description

Up to 55 mm or more across; initially ellipsoidal to subglobose, becoming irregular in shape, convoluted and infolded to form inner chambers; surface smooth to minutely scabrous; colour initially white, becoming greyish white, at maturity may have tints of yellow, brown or pink. **Spore Print** White

Microscopic Features

Ascospores 10–12 × 8–9 μm, ellipsoidal, ornamented with warts, thick-walled. Asci eight-spored, 230–260 × 12–15 μm.

Comments

Hydnoplicata convoluta is a distinctive species, readily identified by its whitish convoluted fruit-body, which is usually buried or just exposed above the soil. Until quite recently this species was known as *Peziza whitei*, but DNA analysis done by Hansen *et al.* (2002) clearly showed that this species does not belong to the *Peziza* genus. It was later renamed *H. convoluta* by Trappe and Claridge (2006).

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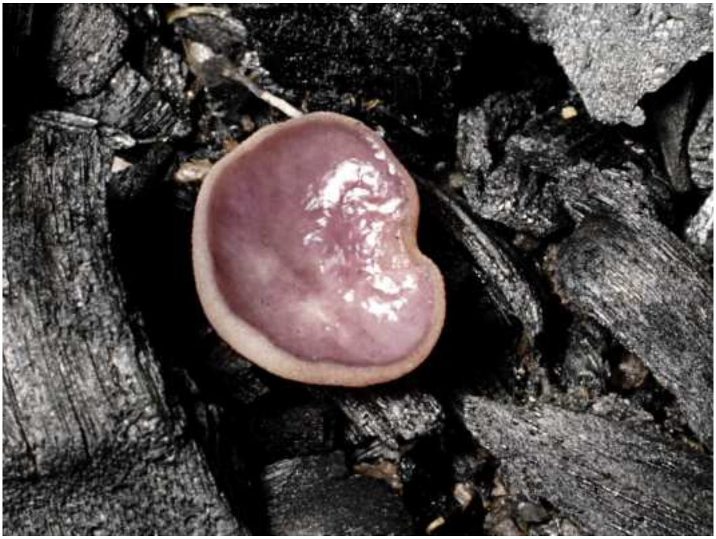
Fam. Pezizaceae

Peziza tenacella



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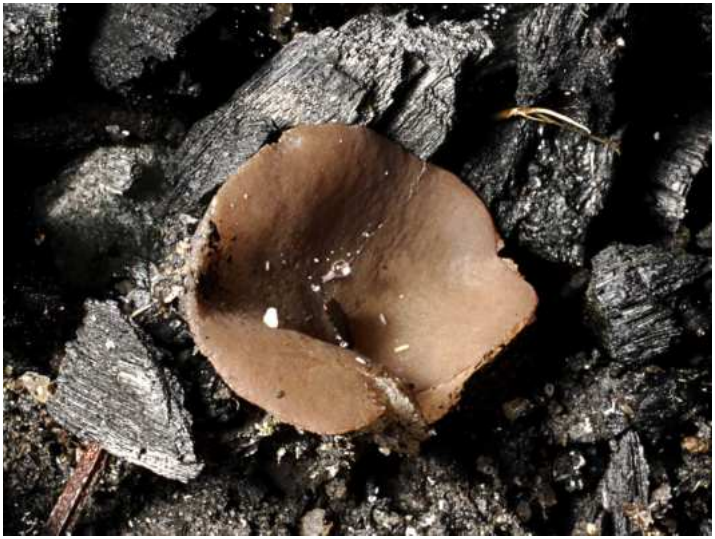

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Fam. Pezizaceae

Peziza tenacella

Humaria tenacella

Biology

Saprotrophic ascomycete; either solitary or gregarious on burnt ground, usually amongst charcoal debris.

Fruit-body Description

Up to 30 mm or more across; initially cup-shaped, becoming irregularly expanded and nearly flat, often wavy. **Inner Surface** spore-bearing, smooth, initially purple, turning purplish brown and finally umber. **Outer Surface** purplish white to white, minutely scurfy (with small bran-like scales) to almost smooth. **Stipe** rarely substipitate, normally sessile. **Spore Print** White

Microscopic Features

Ascospores 10.5–12 × 5–6.5 μm, smooth-walled, but very minutely warted at complete maturity, ellipsoidal, with two oil drops. Asci eight-spored, 185–220 × 7–8.5 μm. Paraphyses slender, septate, unbranched, apex clavate, curved or almost hooked, with coloured contents.

Comments

Peziza tenacella is found on charcoal, either after a bush fire or on the charcoal ash of an old camp fire. The immature cups or discs are violet and become umber as they mature. Care must be taken when identifying this species as there are other purplish *Peziza* species, such as *P. praetervisa* and *P. pseudoviolacea*, which also appear after fire. These species tend to retain the purplish colour more so than *P. tenacella*. This is one of many fungus species that rapidly appear after a bush fire. It seems that post-fire fungal growth helps to stabilise and rehabilitate soil, and facilitates plant establishment.

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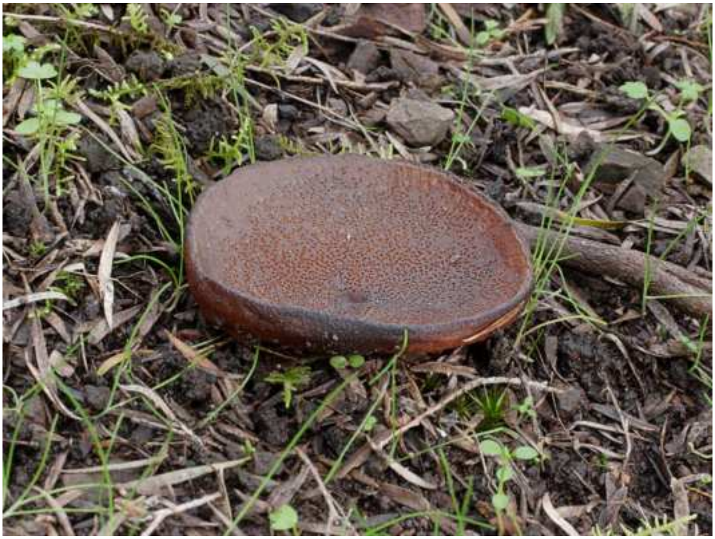
Fam. Pezizaceae

Peziza thozetii



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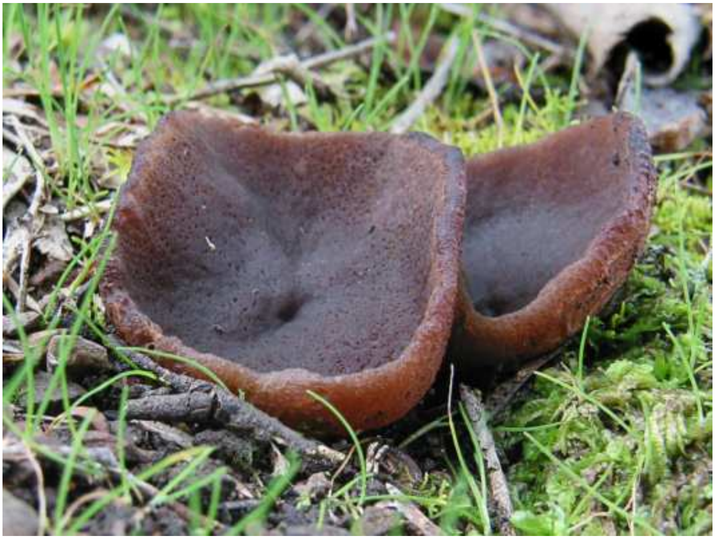

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Fam. Pezizaceae

Peziza thozetii

Humaria thozetii

Biology

Saprotrophic ascomycete; either solitary or gregarious on damp soil, often amongst mosses.

Fruit-body Description

Up to 25 mm or more across; initially cup-shaped, becoming irregularly expanded and nearly flat, with inrolled margin. **Inner Surface** spore-bearing, smooth, when mature pitted, brown to olive-brown. **Outer Surface** lighter in colour, rough, scurfy (with small bran-like scales). **Stipe** central, usually absent, or when present only as a short narrow stub; when absent, mature fruit-body attached to substrate by mycelial strands. **Spore Print** Pale brown

Microscopic Features

Ascospores 23–26 × 9–12 μm, ellipsoidal, finely warty, without any oil drops, truncated conical apiculus at each end. Asci eight-spored, 300–400 × 13–15 μm.

Comments

Peziza thozetii is a medium-sized cup fungus identified in the field by its brown colour, pitted inner surface and habitat on soil. Since there are numerous brownish cup fungi, the spores need to be examined for positive identification. The finely warty ellipsoidal spores, with a conical ornamentation (apiculus) at each end, will positively identify this fungus.

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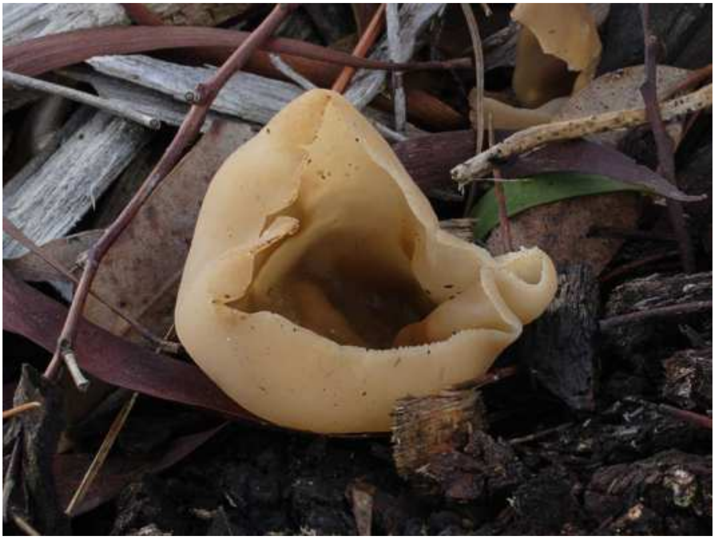
Fam. Pezizaceae

Peziza varia



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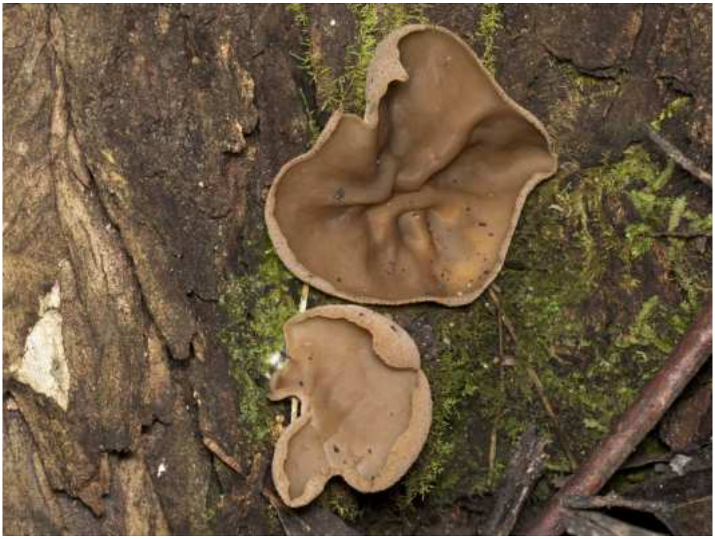

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Fam. Pezizaceae

Peziza varia

Peziza cerea *Peziza repanda* – probable
Peziza micropus

Biology

Saprotrophic ascomycete; either solitary or gregarious on dead wood, woodchip mulch, rich soil, sandy soil, rotting herbaceous debris, occasionally on burnt soil, and herbivore dung.

Fruit-body Description

Up to 60 mm or more across; initially cup-shaped, becoming irregularly expanded and nearly flat, often wavy, sessile or with a residual stipe. **Inner Surface** spore-bearing, smooth, pale brown to hazelnut, hygrophanous. **Outer Surface** greyish-brown to whitish when dry, and brown when wet, minutely scurfy (with small bran-like scales), hygrophanous. **Stipe** central, usually absent, or when present only as a short narrow stub; when absent, mature fruit-body attached to substrate by mycelial strands. **Spore Print** White

Microscopic Features

Ascospores 14.5–17.5 × 8–10.5 μm, smooth, or with with very fine warts (× 1000), ellipsoidal, without any oil drops. Asci eight-spored, 225–300 × 12–15 μm. Paraphyses slightly longer than asci, filiform, multiseptate, with an enlarged apex.

Comments

The phylogenetic concept for *Peziza varia* put forward by Hansen *et al.* (2002) is used to identify this species, but unfortunately this has made identifying *P. varia* by its morphological features in the field difficult; microscopic examination is essential. The reasons for the difficulty in identifying *P. varia* in the field was highlighted by Hansen *et al.* (2002), and Medardi *et al.* (2012). By using phylogenetic and morphological analysis they concluded that the morphological characteristics of *P. varia* are significantly influenced by the environment. From their analysis they were also able to conclude that the taxonomic significance of the substrate is not a valid feature in *Peziza* identification. Hansen *et al.* (2002) also showed that phylogenetic analysis of species which were previously identified as *P. cerea*, *P. micropus* and *P. repanda* by their morphological characteristics were actually morphological variants of *P. varia.*

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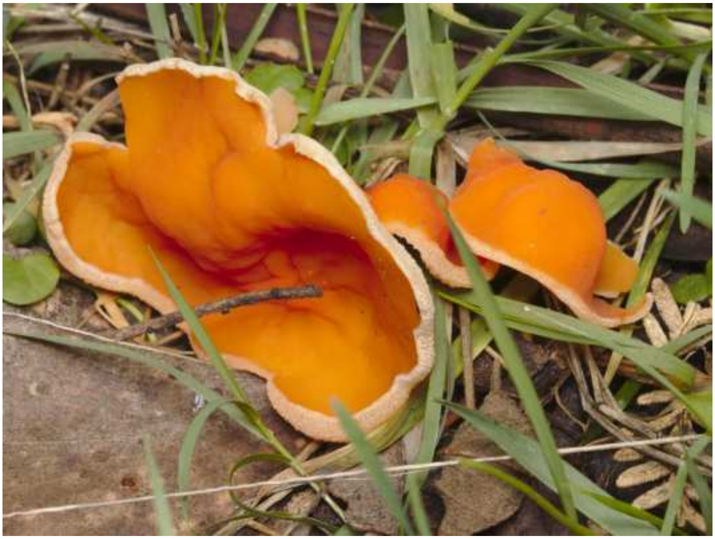
Fam. Pyronemataceae

Aleuria aurantia



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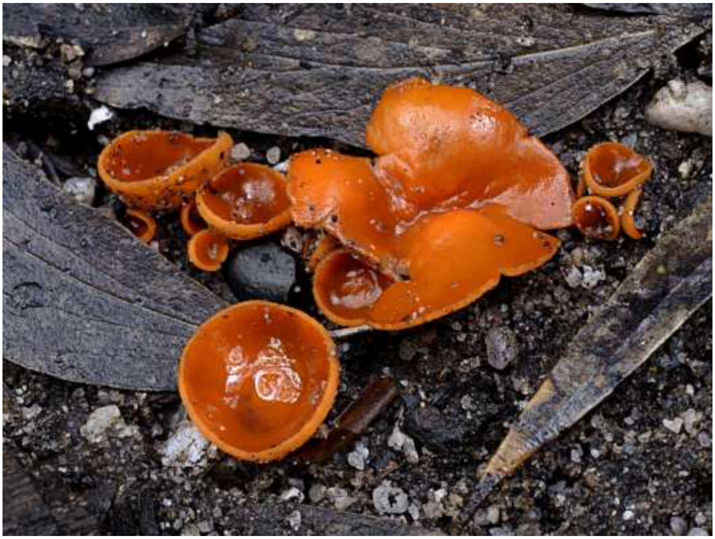

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Fam. Pyronemataceae

Aleuria aurantia

Biology

Saprotrophic ascomycete; often found on disturbed ground, on path or road embankments, on bare loamy sandy soil, and also amongst grass.

Fruit-body Description

Generally up to 100 mm across; initially cup-shaped, becoming irregularly expanded and flat; resting stalkless on the ground. **Inner Surface** spore-bearing, smooth and bright orange. **Outer Surface** lighter in colour and covered with fine white hairs visible with a hand lens. **Spore Print** White

Microscopic Features

Ascospores 14–16 × 7–10 μm (not including ornamentation), with distinct, coarsely reticulated ornamentation. Asci eight-spored, 185–200 × 10–13 μm.

Comments

Aleuria aurantia is an attractive bright orange cup fungus that grows on soil, usually in small dense groups. The cups have an almost non-existent stipe at the base, and flatten with age. Because of its colour and shape it has the common name "Orange-peel Fungus".

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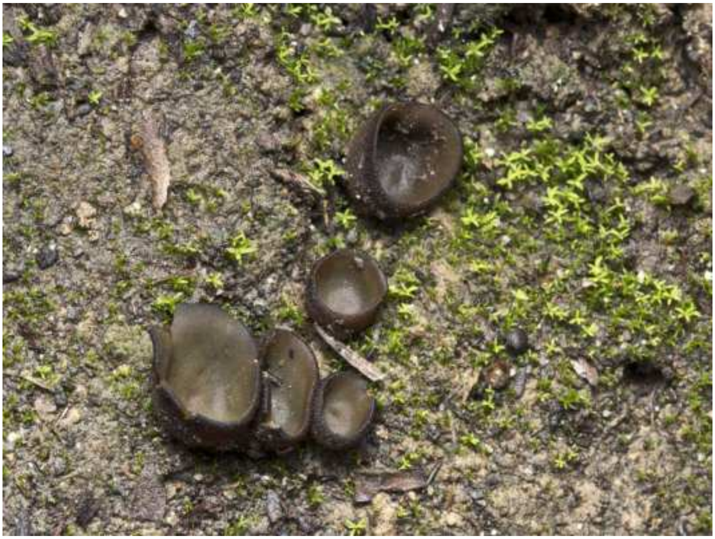
Fam. Pyronemataceae

Aleurina argentina



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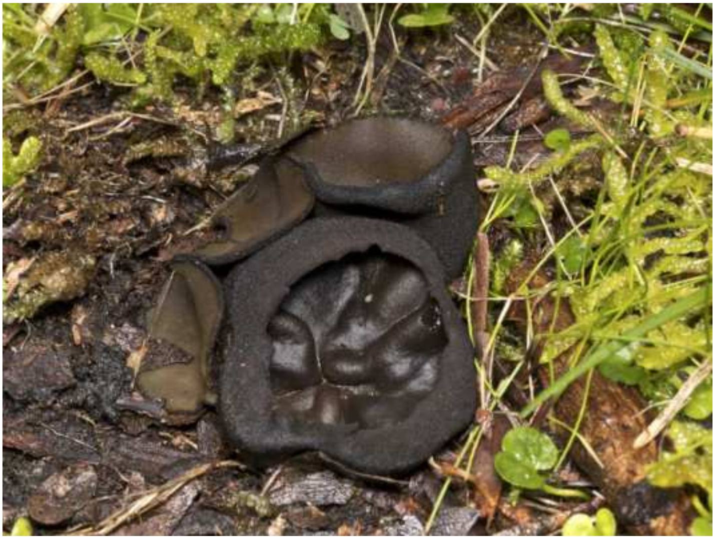

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Fam. Pyronemataceae

Aleurina argentina

Jafneadelphus argentinus

Biology

Saprotrophic ascomycete; often found in small groups on the ground amongst forest litter or moss.

Fruit-body Description

Generally up to 20 mm or more across, initially deep cup-shaped, with a raised rim, with age becoming flattish; resting on the ground, no stipe. **Inner Surface** spore-bearing, smooth, dark brown to dark purplish brown. **Outer Surface** slightly darker in colour, rough and warty. **Spore Print** White

Microscopic Features

Ascospores 17.5–23.5 × 10–14 μm, ellipsoidal, ornamented with dome-shaped warts, diameter up to 3.5 μm . Asci 280–310 × 14–17 μm. Paraphyses not exceeding length of asci, apex has a thickish knob 6–8.5 μm wide, below apex 3.5–4.5 μm wide.

Comments

This species can be identified by its very dark brown inner surface, together with the rough warty outer surface and lack of a stipe. A similar species, *Aleurina ferruginea* is much lighter in colour.

References

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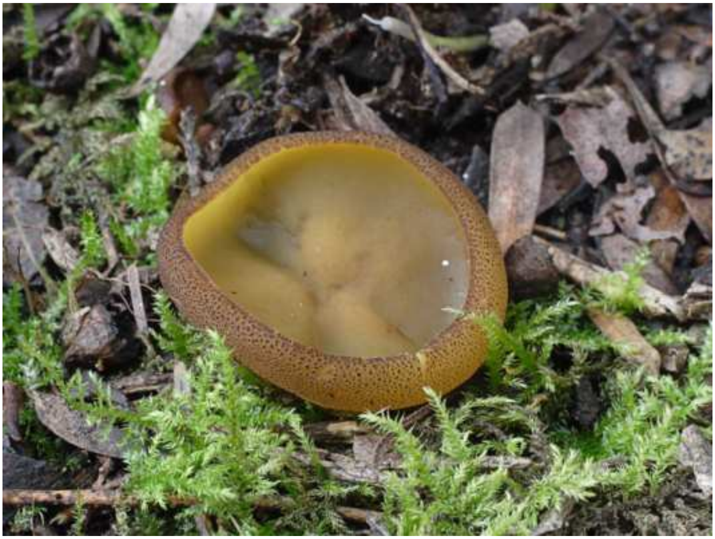
Fam. Pyronemataceae

Aleurina ferruginea



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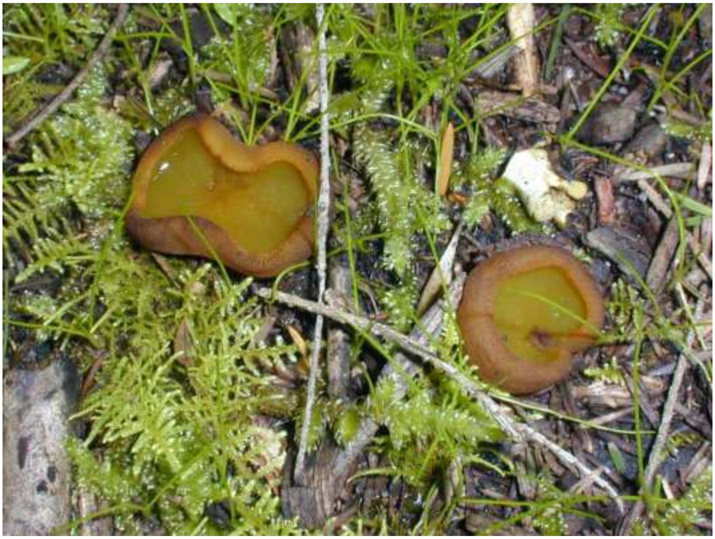

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Fam. Pyronemataceae

Aleurina ferruginea

Biology

Saprotrophic ascomycete; often found in small groups on the ground amongst forest litter or moss.

Fruit-body Description

Generally up to 20 mm across, cup-shaped, with a raised rim; resting on the ground, no stipe. **Inner Surface** spore-bearing, smooth, yellowish brown to olivaceous brown. **Outer Surface** lighter in colour, covered in fine hairs and small brown warts. **Spore Print** White

Microscopic Features

Ascospores 22–32 × 11–15 μm, ellipsoidal, with distinct hemispherical ornamentation up to 3.5 μm. Asci 250–360 × 14–21 μm.

Comments

The smooth yellowish brown inner surface, together with the small brown warts on the outer surface and lack of a stipe, readily distinguish this species.

References

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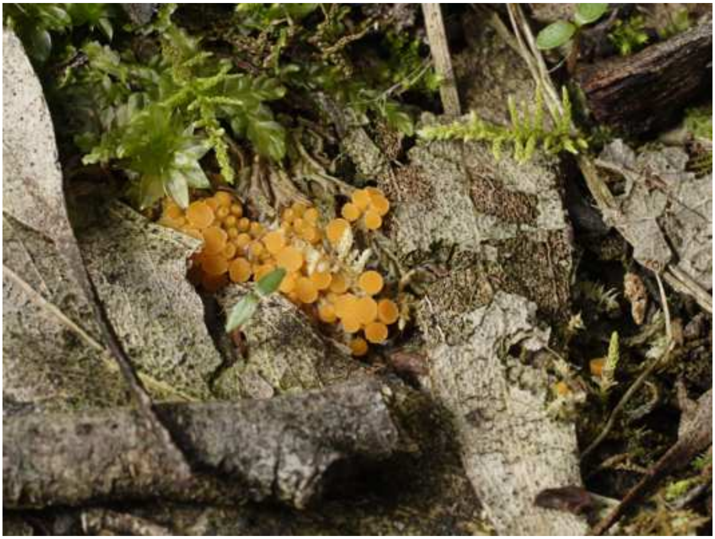
Fam. Pyronemataceae

Byssonectria fusispora



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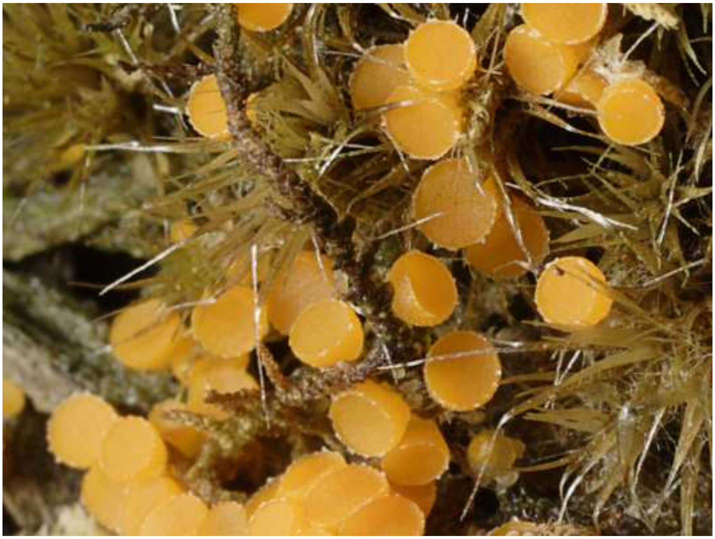

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Fam. Pyronemataceae

Byssonectria fusispora

Peziza fusispora *Octospora carbonigena*
Peziza carbonigena *Inermisia fusispora*

Biology

Saprotrophic ascomycete; gregarious to densely crowded colonies on damp or burnt soil.

Fruit-body Description

Disc diameter to 3 mm; saucer-shaped to flat disc-like; resting sessile or with a rudimentary stipe on a white network of mycelium on the ground. **Inner Surface** spore-bearing, smooth; colour bright yellowish orange. **Outer Surface** same colour as the inner surface and minutely downy towards the base. **Spore Print** White

Microscopic Features

Ascospores 20–25 × 8–10 μm, fusiform, with 2 large oil drops. Asci eight-spored, 200–240 × 12–16 μm, ascospores obliquely uniseriate (in a single line). Paraphyses same length as asci, about 2 μm thick, thicker at the tips.

Comments

Byssonectria fusispora fruit-bodies form dense colonies on the ground and are identified by their bright yellowish orange colour and small size, up to only 3 mm in diameter. There are a number of fungi with fruit-bodies consisting of small yellowish discs, therefore to be sure of the identification microscopic examination is recommended.

References

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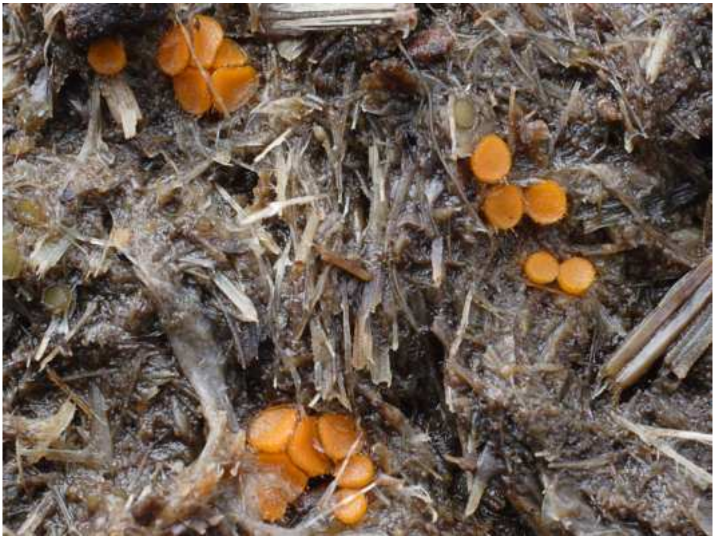
Fam. Pyronemataceae

Cheilymenia coprinaria



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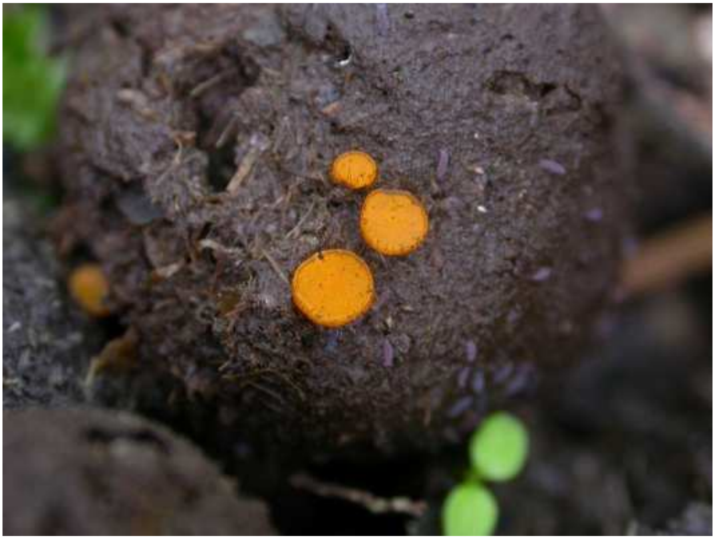

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Fam. Pyronemataceae

Cheilymenia coprinaria

Scutellinia coprinaria *Scutellinia michiganensis*

Biology

Saprotrophic ascomycete; gregarious on herbivore dung and manure; fruiting whenever conditions such as temperature and moisture are suitable.

Fruit-body Description

Usually up to 2 mm, and rarely up to 5 mm across; saucer-shaped to disc-like; resting stalkless on the substrate. **Inner Surface** spore-bearing, smooth; colour orange, becoming brownish with age; margin fringed with minute orange to reddish brown stiff hairs that are almost 1 mm long. **Outer Surface** lighter in colour and covered with fine dark hairs visible with a hand lens (the nature of the substrate will most likely discourage such close examination). **Spore Print** White

Microscopic Features

Ascospores 16–22 × 8–12 μm, smooth, ellipsoidal, without oil droplets. Asci eight-spored, 170–220 × 10–14 μm. Paraphyses about same length as asci, containing orange granules, swollen at the apex. Hairs septate and distinctly forked at the base.

Comments

This is a cosmopolitan species. Within this genus there are a number of very similar looking species all consisting of small yellow to orange discs; for positive identification microscopic features need to be examined. If the fruit-bodies are found on horse or cow dung and consist of orange discs up to 2 mm diameter they are most likely to be *C. coprinaria*.

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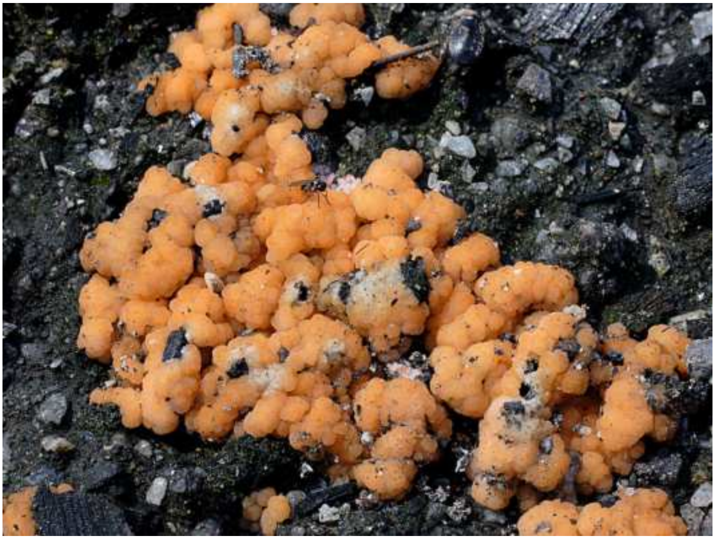
Fam. Pyronemataceae

Pyronema omphalodes



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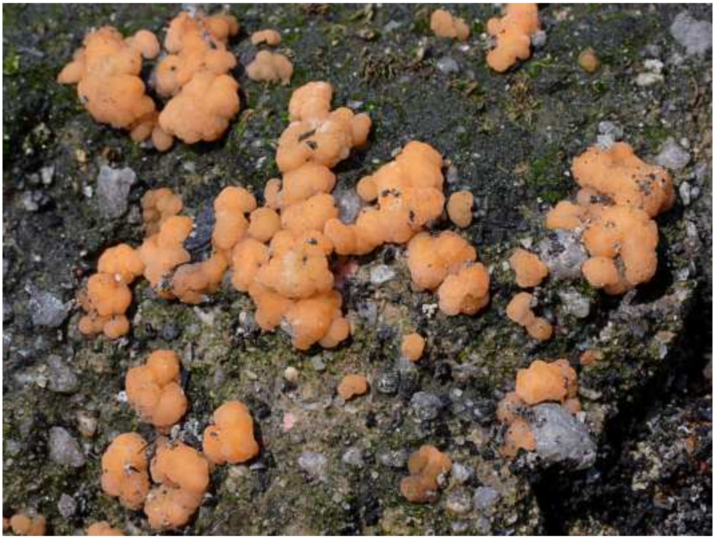

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Fam. Pyronemataceae

Pyronema omphalodes

Biology

Saprotrophic ascomycete; gregarious, forming largish patches on burnt ground amongst wood ash.

Fruit-body Description

Consists of minute convex discs up to 1 mm diameter, but usually becoming confluent in large orange to reddish orange patches, without any raised margin, surrounded by conspicuous cobweb-like white mycelium. **Spore Print** White

Microscopic Features

Ascospores 11–15 × 6.5–8.5 μm, smooth, ellipsoidal. Asci eight-spored, 150 × 15 μm. Paraphyses simple, slightly clavate, 3–4 μm thick at the apex.

Comments

The bright orange to reddish orange patches found on burnt blackened ground, such as old campfire sites, can readily be identified as *Pyronema omphalodes*.

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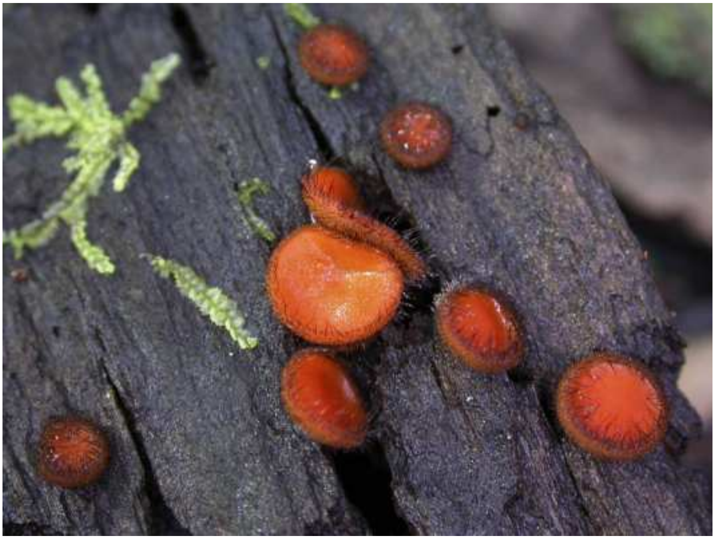
Fam. Pyronemataceae

Scutellinia scutellata complex



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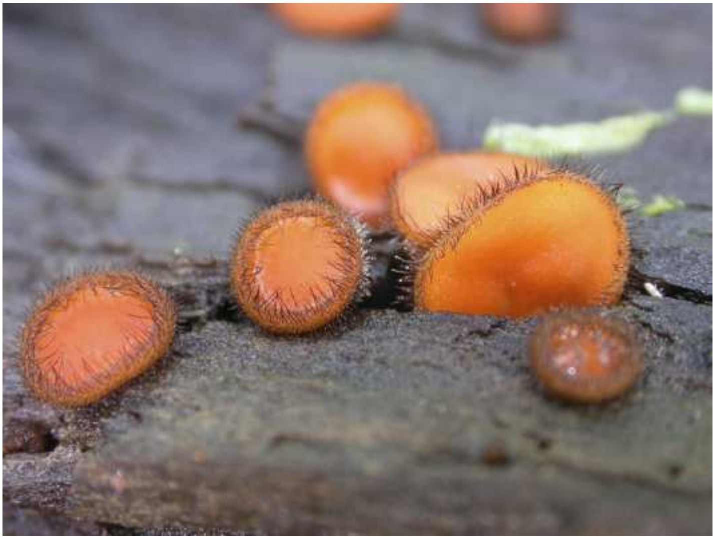

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Fam. Pyronemataceae

Scutellinia scutellata complex

Peziza scutellata

Biology

Saprotrophic ascomycete; scattered or, more frequently, gregarious on rotten wood or damp humus-rich soil.

Fruit-body Description

Up to 12 mm across, at first button-like, soon opening to form a shallow cup, and eventually becoming a convex to flat disc, margin fringed with dark brown to blackish hairs up to 1 mm long; broadly attached to the substrate, without a stipe. **Inner Surface** spore-bearing, smooth, waxy dry, bright orange-red to red. **Outer Surface** covered in tiny dark hairs, brownish to pale orange. **Spore Print** White

Microscopic Features

Ascospores 18–20 × 10–15 μm, ellipsoidal to oblong ellipsoidal, minutely warted, containing 1 or more oil globules. Asci eight-spored, 200–300 × 14–20 μm. Paraphyses slender, 200–300 × 3–4 μm, sparsely septate, apex distinctly enlarged.

Comments

Scutellinia scutellata is a small cup fungus, readily identified by the bright reddish to reddish orange disc with 1 mm long eyelash-like dark hairs along its margin. *Scutellina* cf. *margaritacea* is found in Western Australia (Bougher and Syme 1998) and may possibly be a variant of this species.

References

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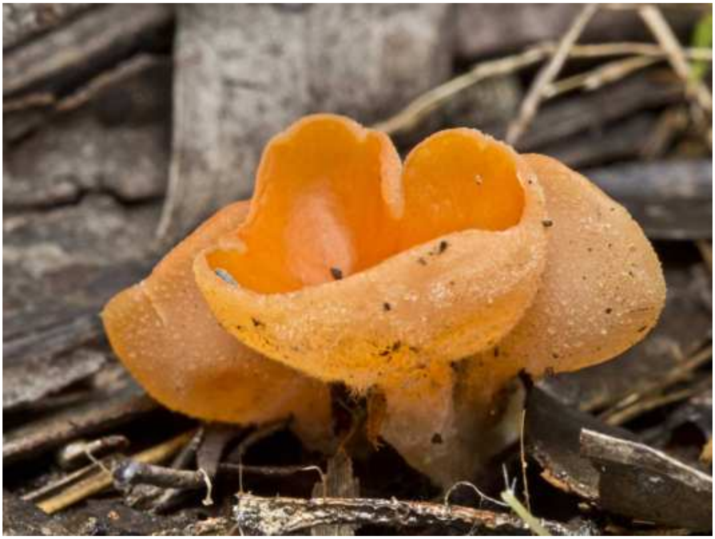
Fam. Pyronemataceae

Sowerbyella rhenana



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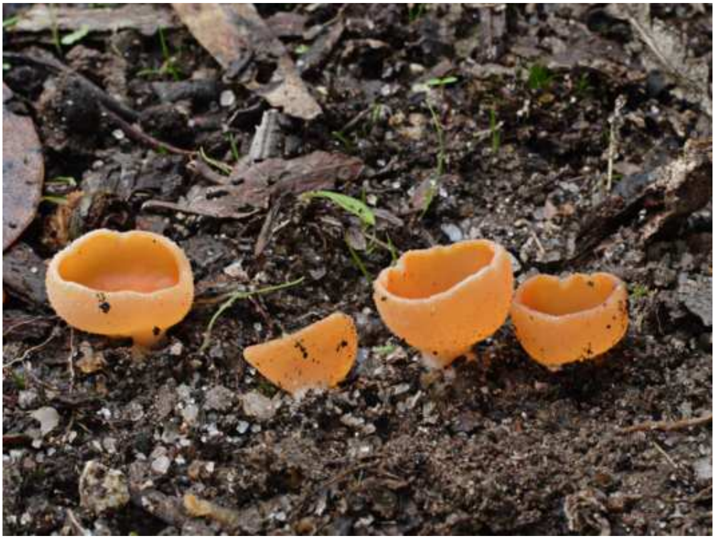

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Fam. Pyronemataceae

Sowerbyella rhenana

Aleuria rhenana

Biology

Saprotrophic ascomycete; often found in clusters on the ground amongst forest litter or moss.

Fruit-body Description

Generally up to 25 mm across; cup-shaped, with a stipe up to 15 mm long and 4 mm thick. **Inner Surface** spore-bearing, smooth and bright orange. **Outer Surface** lighter in colour and covered with fine white hairs. **Spore Print** White

Microscopic Features

Ascospores 16–21.5 × 10–12.5 μm (not including ornamentation), with distinct coarsely reticulated ornamentation. Asci eight-spored, 270–350 × 12–16 μm.

Comments

This small cup fungus is readily identified by its bright orange colour and presence of a whitish stipe. In 1986, J. Moravec separated *Sowerbyella* and *Aleuria* species based on morphological and chemical characters. Moravec (1988) shows that *Aleuria* species have paraphyses containing carotenoid pigments where as *Sowerbyella* species do not. This, plus other morphological features, was enough to warrant changing the name from *Aleuria rhenana* to *Sowerbyella rhenana*.

References

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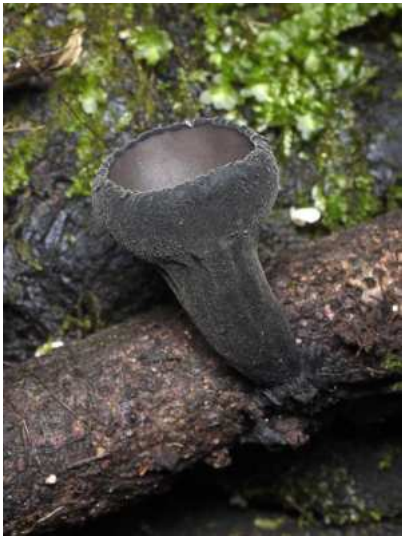
Fam. Sarcosomataceae

Urnula campylospora



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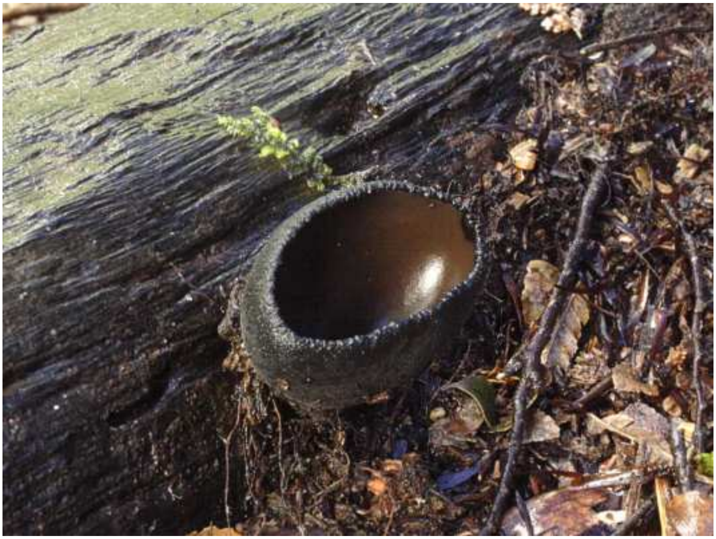

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Fam. Sarcosomataceae

Urnula campylospora

Peziza campylospora *Plectania campylospora*

Biology

Saprotrophic ascomycete; found in wet forests on decaying wood or logs; usually gregarious to caespitose.

Fruit-body Description

Generally up to 80 mm across; discoid, cup- to funnel-shaped, with age rim may become wavy and irregular; subsessile or stipitate; flesh rubbery. **Inner Surface** spore-bearing, smooth, dark brown, occasionally blackish brown. **Outer Surface** rough-textured, dark brown to black. **Stipe** central, may be rubimentary or up to 20 mm long, black, rough. **Spore Print** White

Microscopic Features

Ascospores 23–32 × 9–14 μm uniseriate (in a single line), hyaline, containing 1–3 large oil globules, curved bean-shaped. Asci eight-spored, 400–490 × 14–18 μm.

Comments

Urnula campylospora is a large cup fungus, and is recognised by its brown to brown-black colour, smooth inner surface and rough outer surface, rubbery texture, and habitat on damp rotting wood that is often moss-covered.

References

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2.6 Order: Sordariales

Sordariales
Taxonomic Classification

Kingdom:	Fungi
Phylum:	Ascomycota
Subphylum:	Pezizomycotina
Class:	Sordariomycetes
Subclass:	Sordariomycetidae
Order:	Sordariales

Families

Chaetomiaceae
Lasiosphaeriaceae
Sordariaceae

Sordariales is an order of the class Sordariomycetes, consisting of 3 families, the Chaetomiaceae, Lasiosphaeriaceae, and Sordariaceae, and approximately 35 genera (Huhndorf *et al.* 2004). According to Kirk *et al.* (2008) this order contains 5 families and 97 genera and approximately 309 species. Earlier descriptions of this order had it containing up to 14 families and 115 genera. Fruit-bodies are predominantly flask-like structures (perithecia) in which eight-spored inoperculate asci are produced.

Species within these families have small (mostly less than 1 mm high) flask-shaped perithecia (fruit-bodies) which are usually covered with hair. They are saprophytes; some species can be found on rotting wood, soil, herbaceous animal dung, other fungi, and on cellulose-rich substrates. Most fungi that belong to the Chaetomiaceae family are distributed widely,

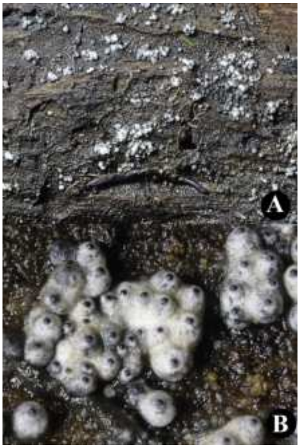

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Figure 2.1: *Lasiosphaeria ovina*

A lignicolus species growing on a decaying log.

the largest genus in this family being *Chaetomium*. *Chaetomium* species are common colonisers of soil and cellulose-containing substrates, and it has been reported that varieties of the common *C. globosum* is used as a biocontrol agent (Soytong *et al.* 2001).

References

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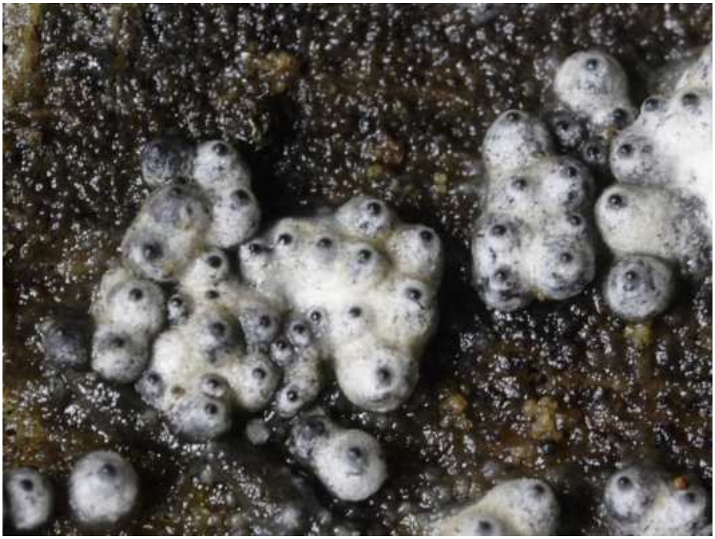
Fam. Lasiosphaeriaceae

Lasiosphaeria ovina



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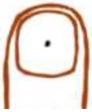

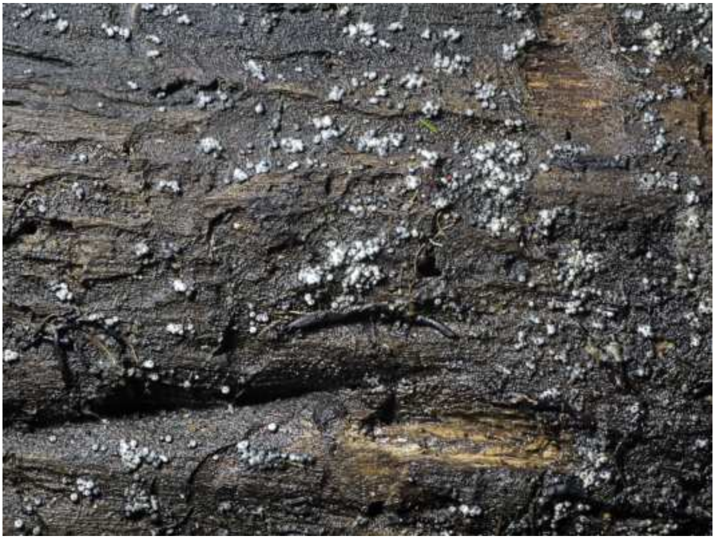

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Fam. Lasiosphaeriaceae

Lasiosphaeria ovina

Biology

Saprotrophic ascomycete; numerous, scattered to compact groups on dead, decorticated wood; in large numbers may resemble a white crust.

Fruit-body Description

Individual fruit-bodies are very small, up to 0.6 mm diameter, spherical to oval, with a black papilla at the apex, sessile (sitting directly on the substrate), somewhat embedded in and surrounded by a mat of greyish hyphal tissue; surface when young covered in a white tomentum (woolly) which can wear away with age, leaving a black undersurface; colour when young white, with age becoming black. **Spore Print** White

Microscopic Features

Ascospores 35–65 × 3–6 μm, smooth, cylindrical, bent, sometimes hockey stick-shaped, with numerous drops. Asci eight-spored, 180–210 × 6–12 μm. Paraphyses filiform, longer than asci, septate, and unbranched.

Comments

Lasiosphaeria ovina is recognised by its small woolly white spherical fruit-bodies, each with a distinctive black papilla on the apex. A hand lens is required to view individual fruit-bodies because they are only up to 0.6 mm across. This species can be found throughout the world, and has been identified in Canada, Costa Rica, Europe, Russia, New Zealand, Philippines, Australia, and USA.

References

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2.7 Order: Xylariales

Xylariales is the only order of the subclass Xylariomycetidae and is estimated to contain 7 families, more than 92 genera and 795 species (Smith *et al.* 2003). Delimitation of the Xylariales, and the families within the order, has long been problematic. According to Kirk *et al.* (2008) the Xylariales contain 9 families, 208 genera and 2487 species. It is clear a significant amount of work remains to be done if this order, with its families and genera, is to become more clearly defined.

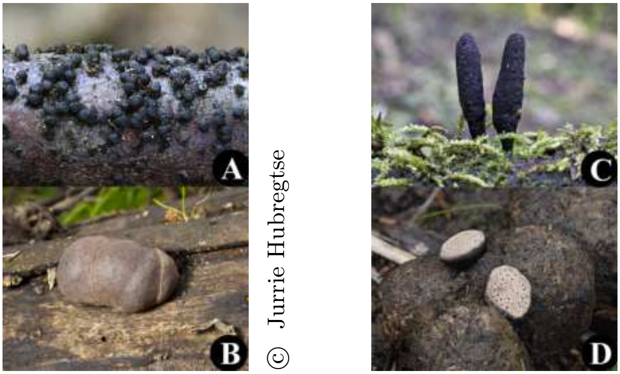
Most species within this order have well developed carbonaceous fruit-bodies encasing perithecial ascomata (i.e. the part of the fruit-body containing the asci), in which eight-spored inoperculate asci are produced.

Most are thought to be saprophytic, often found on new or old dead wood, but some species in the genus *Rosellinia* are considered serious crop pathogens.

Xylariales
Taxonomic Classification

Kingdom:	Fungi
Phylum:	Ascomycota
Subphylum:	Pezizomycotina
Class:	Sordariomycetes
Subclass:	Xylariomycetidae
Order:	Xylariales

Families
Amphisphaeriaceae
Apiosporaceae
Clypeosphaeriaceae
Diatrypaceae
Graphostromataceae
Hyponectriaceae
Xylariaceae



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A. *Annulohypoxylon bovei* **C.** *Xylaria castorea*
B. *Daldinia grandis* **D.** *Poronia erici*
All of the above species belong in the family Xylariaceae.

There are also a number of endophytic species in this order. In the family Xylariaceae, species have been documented on conifers, monocots, dicots, ferns and lycopsids. It is likely that some species are quiescent colonisers that will later decompose cellulose and lignin when the plant begins to die (Davis *et al.* 2003).

References

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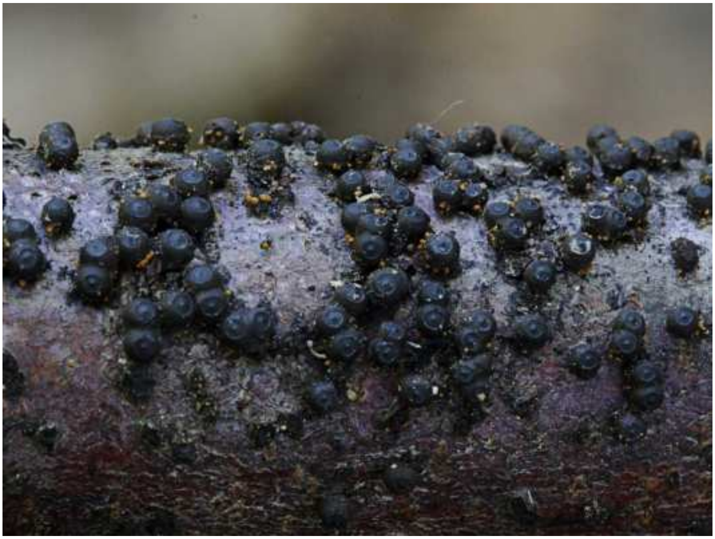
Fam. Hypoxylaceae

Annulohypoxylon bovei



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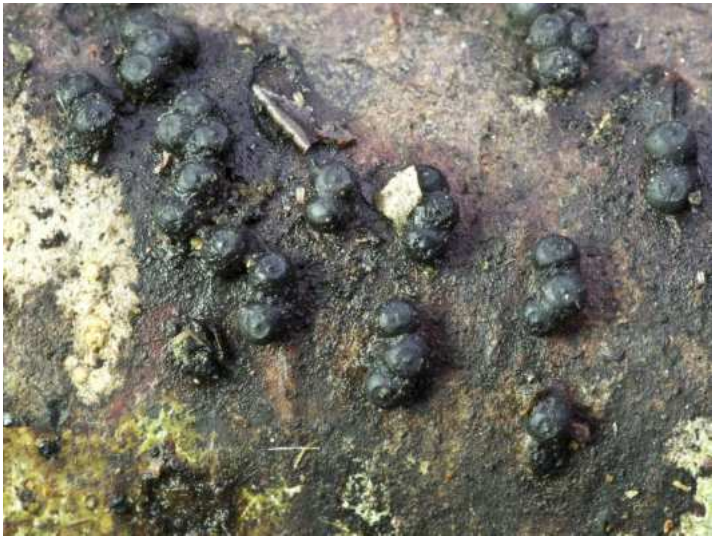

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Fam. Hypoxylaceae

Annulohypoxylon bovei

Hypoxylon bovei

Biology

Saprotrophic ascomycete; scattered or clusters of fruit-bodies rarely forming a crust on dead Myrtle Beech *Nothofagus cunninghamii* wood.

Fruit-body Description

Usually clusters of subglobose, dome-shaped fruit-bodies; the domes are spherical carbonaceous perithecial mounds, which can be up to 5 mm diameter; on the top of each mound there is a flat disc with a small central protrusion (ostiole); colour dark purple-brown when young, ageing to black. **Perithecia** up to 1 mm diameter; ostioles papillate (small rounded protrusions), encircled by a disc up to 0.7 mm diameter. **Spore Print** Black

Microscopic Features

Ascospores 10.5–13 × 5–6.5 μm, smooth, ellipsoidal-inequilateral, with narrowly rounded ends, and a straight germ slit on the convex side of the spore, almost full spore length. Asci 170–200 × 8–9 μm, eight-spored.

Comments

Annulohypoxylon bovei can be identified in the field because it looks like a gregarious group of black dome-shaped fruit-bodies with a flattened disc at the apex, which has a central protrusion, and it is found on dead Myrtle Beech *Nothofagus cunninghamii* wood. DNA analysis (Hsieh *et al.* 2005) has shown that species with this characteristic morphology do not belong to the *Hypoxylon* genus as first thought. They have been placed in a new closely related genus, *Annulohypoxylon*.

References

Hsieh H-M, Ju Y-M and Rogers JD (2005) "Molecular phylogeny of *Hypoxylon* and closely related genera". *Mycologia* **Vol. 97(4), pp. 844–865**

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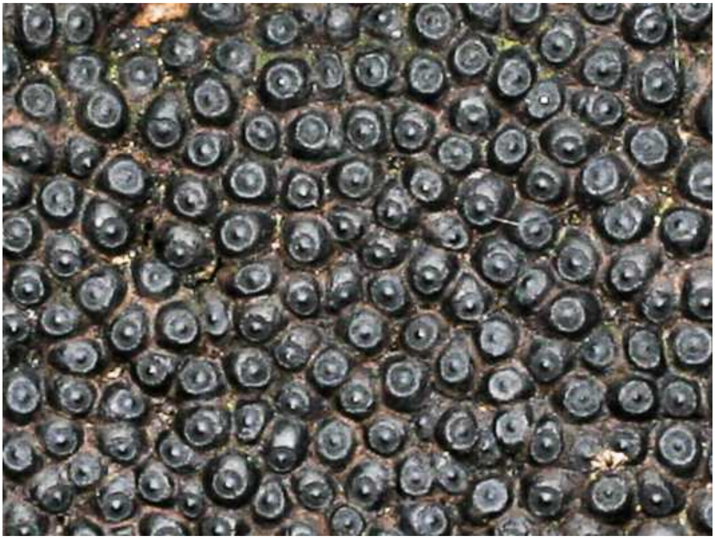
D=Description; **I**=Illustration; **CI**=Colour Illustration; **P**=Photo; **CP**=Colour Photo

Fam. Hypoxylaceae

Annulohypoxylon bovei var. *microspora*



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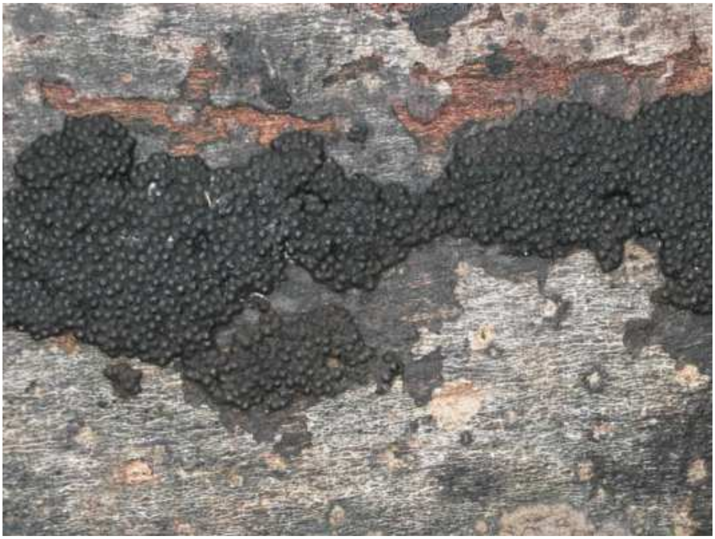

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Fam. Hypoxylaceae

Annulohypoxylon bovei var. *microspora*

Hypoxylon bovei var. *microspora* *Annulohypoxylon bovei* var. *microsporum*

Biology

Saprotrophic ascomycete; fruit-body forms an adhering crust, typically found on decorticated dead wood.

Fruit-body Description

Blackish crust made up of closely packed domes, patches up to 200 mm × 50 mm or more, surface uneven due to protruding perithecia. **Perithecia** partially immersed or almost free, subglobose, up to 1 mm diameter; ostioles papillate (small rounded protrusions), encircled by a disc up to 0.7 mm diameter. **Spore Print** Black

Microscopic Features

Ascospores 8.5–10.5 × 4–5 μm, smooth, ellipsoidal-inequilateral, with narrowly rounded ends, and a straight germ slit on the convex side of the spore, almost full spore length. Asci 115–175 × 4.5–6 μm, eight-spored.

Comments

Annulohypoxylon bovei var. *microspora* can be identified in the field because it tends to form largish black crusts made up of closely packed domes on dead wood other than Myrtle Beech *Nothofagus cunninghamii*. DNA analysis (Hsieh *et al.* 2005) has shown that species with this characteristic morphology do not belong to the *Hypoxylon* genus as first thought. They have been placed in a new closely related genus, *Annulohypoxylon*.

References

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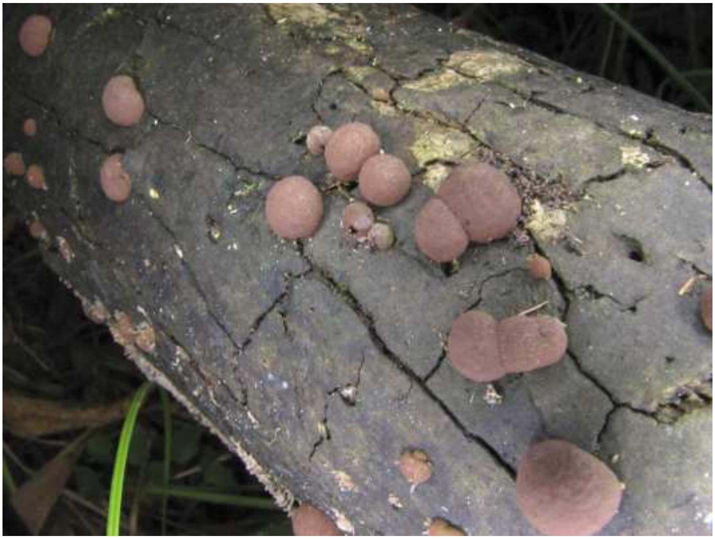
Fam. Hypoxylaceae

Hypoxylon howeianum



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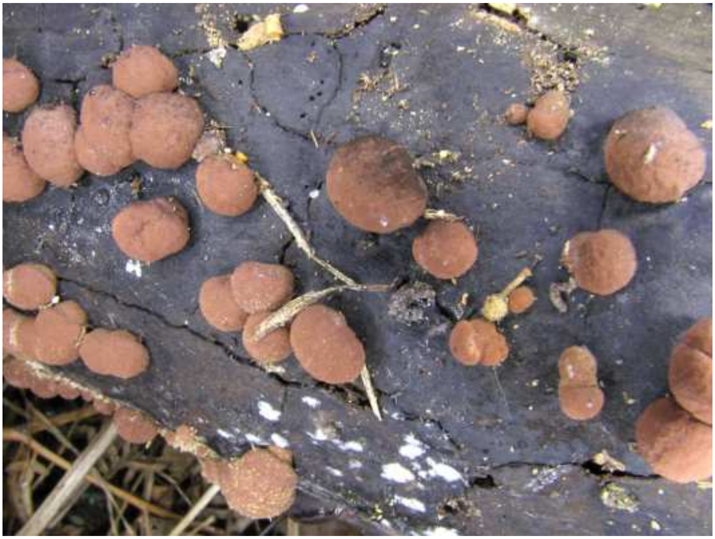

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Fam. Hypoxylaceae

Hypoxylon howeianum

Biology

Saprotrophic ascomycete; found on bark or decorticated wood, in groups of cushion-like crusts, usually in association with its anamorph (asexual stage) consisting of conspicuous dark brown cord- or rope-like clusters. Usually found on recently dead wood.

Fruit-body Description

Stromata (sexual stage) up to 10 mm or more in diameter and up to 6 mm thick; hemispherical, cushion-like, at times coalescent; surface roughened, usually by conspicuous perithecial mounds; colour varies from orange-brown to dark brown. **Perithecia** up to 500 μm high and 300 μm in diameter, obovoid (oblong) to subglobose. **Anamorph** (asexual stage) consisting of dark brown cords up to 15 mm long or more radiating from the base of young stromata. **Spore Print** Black

Microscopic Features

Ascospores 6.5–9 × 3.4–5 μm, smooth, ellipsoidal-inequilateral, with narrowly rounded ends, and a faint straight germ slit (full spore length) on the convex side of the spore; in KOH appear dark brown. Asci eight-spored, 93–144 × 4–7 μm, spores confined to upper half.

Comments

Hypoxylon howeianum is a cosmopolitan species, usually found on recently dead wood, and is recognised by its orange-brown to dark brown colour and hemispherical-shaped fruit-bodies. It is common to find it in large eruptions on recently fallen branches.

References

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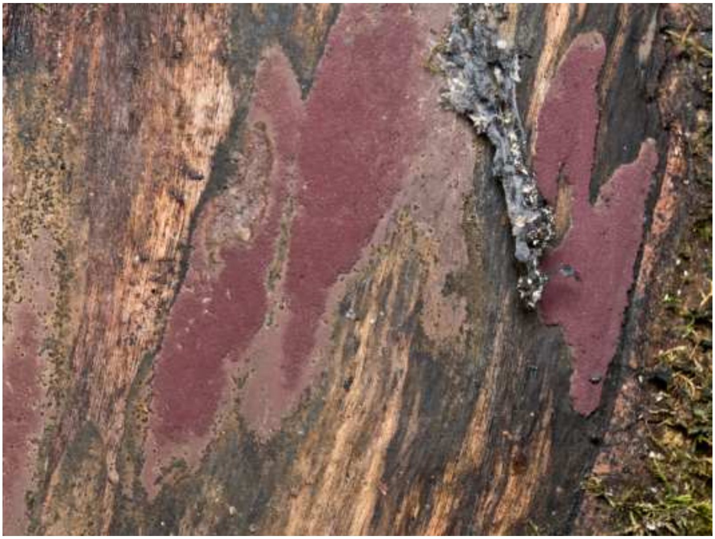
Fam. Hypoxylaceae

Hypoxylon aff. *rubiginosum*



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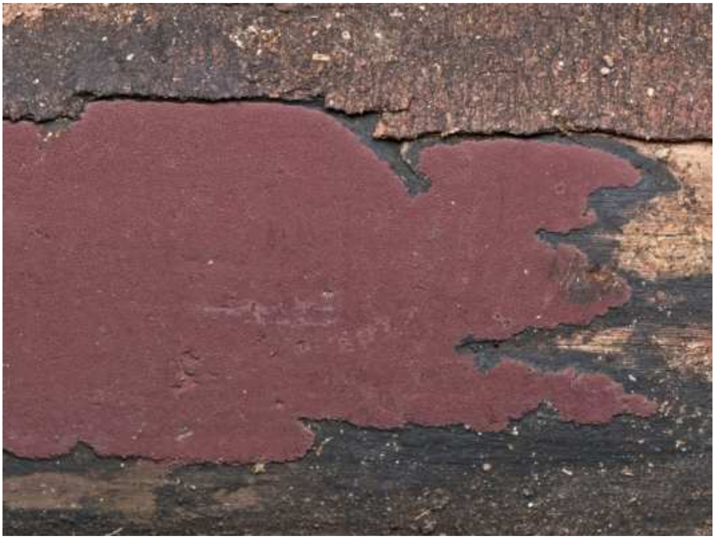

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Fam. Hypoxylaceae

Hypoxylon aff. *rubiginosum*

Biology

Saprotrophic ascomycete; found on decorticated wood, may form extensive crust patches, usually on recently dead wood of *Pomaderris* spp. It is often found in association with other black crusts, possibly other *Hypoxylon* or *Hypocrea* species.

Fruit-body Description

Teleomorph (sexual stage) forms extensive crust patches, which can be up to a metre or more in length, and 1.2–2 mm thick; surface roughened by perithecial mounds, which can be up to 0.5 mm across and about 0.2 mm height with a whitish ostiole in the centre; colour varies from purple to reddish purple. It has a subsurface layer consisting of yellowish brown grains of azophilone pigments, above the black, brittle flesh of the fruit-body. **Perithecia** up to 900 μm high and 500 μm in diameter, obovoid. **Anamorph** (asexual stage) not seen. **KOH-extractable pigment** orange. **Spore Print** Black

Microscopic Features

Ascospores 14.5–17 × 7–9 μm (mean $15.7 \pm 0.6 \times 7.8 \pm 0.4$ μm, $Q=2.02 \pm 0.09$, $n=30$), smooth, ellipsoidal-inequilateral, with narrowly rounded ends, and a faint straight germ slit (full spore length) on the convex side of the spore; appear dark brown in KOH. Asci eight-spored, 240–280 × 8.5–12 μm, spores confined to upper third to half of the ascus.

Comments

This species is easily seen as large purplish patches usually on recently dead *Pomaderris* species. If the fruit-body is not old it can be identified by the whitish ostioles, and by the orange, KOH-extractable pigment (for this test a small tube of 5–10 % solution of KOH is required). For more certain identification microscopic examination is necessary. This species has many similarities to the northern hemisphere species *H. placentiforme* and *H. rubiginosum* (Ju and Rogers (1996) with which it is often confused.

Hypoxylon placentiforme does not have a yellowish brown subsurface layer, its ascii are much smaller 140–170 × 7.5–11 μm, it has a similar spore size 8.5–18.5 × 4.5–8 μm, and its KOH-extractable pigment tends to be greenish olivaceous.

Hypoxylon rubiginosum has a yellowish brown subsurface layer, its ascii are much smaller 100–170 × 5.5–8 μm, it has a significantly smaller spore size 9–12 × 4–4.5 μm, and its KOH-extractable pigment tends to be orange.

It is clear from the observed morphology that this species is neither *H. placentiforme* nor *H. rubiginosum*. The work on chemotaxonomy by Stedler *et al.* (2004) and Stadler and Fournier (2006) shows that the colours of the subsurface pigment and KOH-extractable pigments are indispensable for species recognition in *Daldinia* and *Hypoxylon*/*Annulohypoxylon* genera. Since this species has a similarly coloured KOH-extractable pigment and subsurface layer to *H. rubiginosum*, then inferring from the work by Stadler and Fournier, this species and *H. rubiginosum* are most likely closely related. Therefore it is preferable to call this species *Hypoxylon* aff. *rubiginosum* rather than *Hypoxylon* aff. *placentiforme*.

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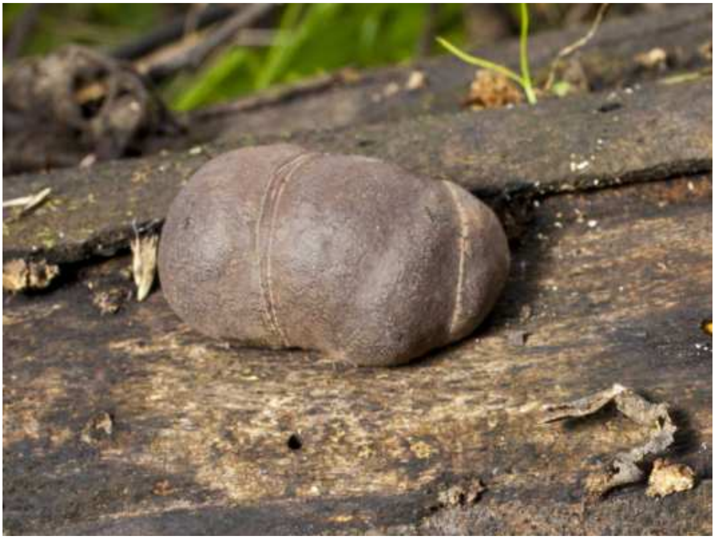
Fam. Xylariaceae

Daldinia grandis



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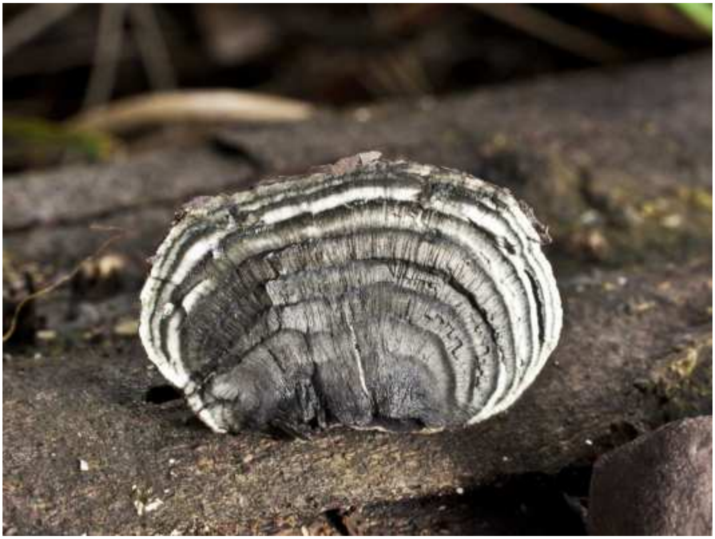

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Fam. Xylariaceae

Daldinia grandis

Biology

Saprotrophic and weak parasitic ascomycete; solitary or gregarious, usually on dead but occasionally on live wood, often appearing after fire, causing white rot in the host.

Fruit-body Description

Up to 80 mm across; hemispherical, subglobose to irregularly round, without a stipe; surface dry, hard, shiny, smooth or with minute bumps (perithecial mounds); colour light brown at first, later becoming black; **Interior** composed of alternating greyish and black concentric layers. **Perithecia** just under the surface, tubular, 0.3–0.5 mm diameter and 0.7–1.5 mm high; ostioles slightly papillate. **KOH-extractable pigment** pigment extracted from a relatively fresh fruit-body is purple to dark livid purple. **Spore Print** Black

Microscopic Features

Ascospores 14–22 × 7–11 μm, elongate-ellipsoidal, highly variable, with a straight germ slit the length of the spore, on the more convex side. Asci 220–250 × 10–13 μm. Paraphyses not abundant, same length as asci.

Comments

The genus *Daldinia* has about 19 recognised species throughout the world and the morphology of most of the species is very similar. This makes it difficult to positively identify a *Daldinia* species in the field. The fruit-body shape, spore size and shape, as well as the colour of the KOH-extractable pigment are all needed when identifying a *Daldinia* species. The most common species found in Australia and New Zealand is *Daldinia grandis*, which has a purple KOH-extractable pigment. The Australian species has often been misidentified as *D. concentrica*, a common species found in the northern hemisphere (see Phillips 2006). Its KOH-extractable pigment is hazel, honey or amber in colour, and its spores are smaller than those of *D. grandis*.

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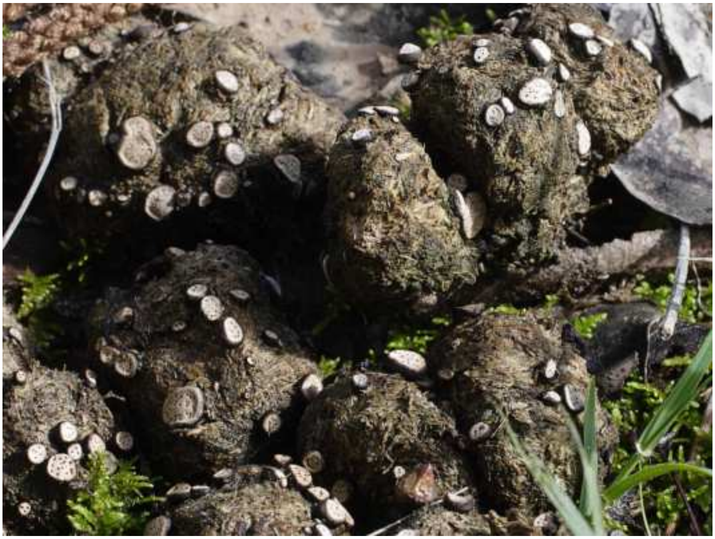
Fam. Xylariaceae

Poronia erici



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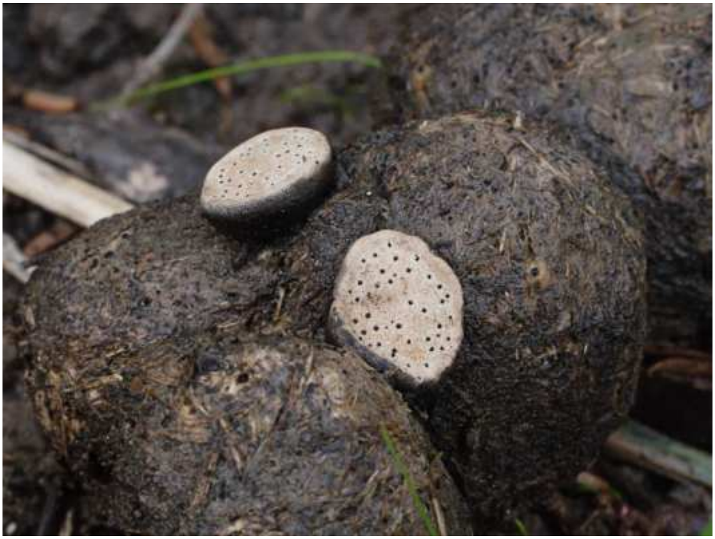

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Fam. Xylariaceae

Poronia erici

Biology

Saprotrophic ascomycete; found on herbivore dung, most common on marsupial dung, occasionally on cow or horse dung.

Fruit-body Description

Diameter usually less than 30 mm, and up to 2 mm thick, irregularly shaped flattened discs with a tapering base embedded in the dung. **Upper Surface** slightly irregular, punctuated with small well spaced brown to black ostioles (holes through which spores are ejected); colour whitish to light pinkish brown. **Lower Surface** smooth, dark greyish brown. **Spore Print** Dark brown

Microscopic Features

Ascospores 27.5–30.5 × 15–17.5 μm, ellipsoidal, smooth. Asci 155–200 × 18–26 μm, eight-spored; spores uniseriate (in a single line).

Comments

Poronia erici is found mainly on the dung of native marsupials where it produces small button-like fruit-bodies. The bulk of the fruit-body consists of sterile tissue in which the spore-bearing perithecium (a sexual spore-bearing flask) is embedded. The sterile tissue is also capable of producing asexual spores (conidia). In the past, this species has been confused with a similar northern hemisphere species *P. punctata* (see Phillips 2006), which has a longish central stalk and smaller spores (18–26 × 7–12 μm) than those of *P. erici*.

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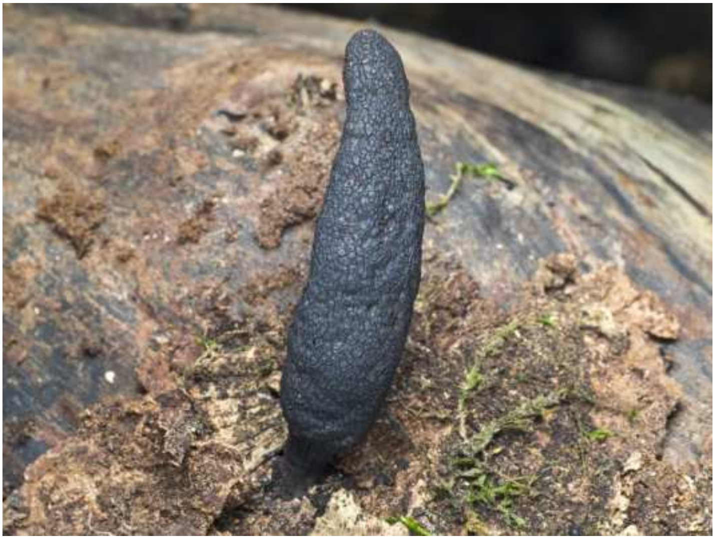
Fam. Xylariaceae

Xylaria castorea



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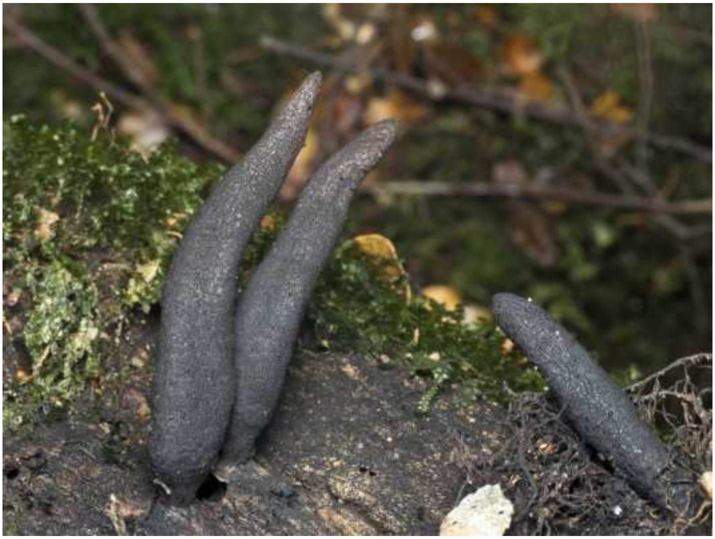

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Fam. Xylariaceae

Xylaria castorea

Biology

Saprotrophic ascomycete; solitary to gregarious but not fused together, typically found on decorticated dead wood.

Fruit-body Description

Unbranched, usually cylindrical, clavate, and sometimes spathulate; height up to 40 mm or more and up to 10 mm thick, if spathulate up to 25 mm wide; apex either rounded or with a pointy tip; surface fertile, becoming finely areolate, slightly rough; ostioles papillate (small rounded protrusions) causing roughness of the surface; colour black; flesh white and brittle. **Spore Print** Black

Microscopic Features

Ascospores 9.5–11 × 5–6 μm, ellipsoidal, inequilateral to nearly symmetrical, nearly opaque; slit usually obscure, probably full length, straight, parallel to long axis. Asci eight-spored, 130–140 × 5.5–7 μm.

Comments

Xylaria species are difficult to separate in the field; they are all the same colour, black, and their morphologies often overlap, but fortunately most can be readily recognised by their microscopic characteristics. In Australia, *Xylaria castorea* has often been misidentified as the northern hemisphere species *X. polymorpha* because the fruit-bodies look the same, but the spores of *X. polymorpha* are much larger (22–29 × 7–9 μm) and they also have their own distinctive shape (see Breitenbach and Krãnzlin 1984).

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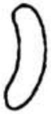
CHAPTER 3

GLOSSARY

As you get more involved with fungi, and in particular when talking with fellow enthusiasts or reading about fungi, the jargon of terms and phrases will eventually become part of your own language. In the meantime, here is a glossary with images to assist with terms that are frequently used by mycologists.

aff. – with affinity to, or similar to.

allantoid – sausage-shaped, usually referring to spores.



amyloid – a chemical staining reaction in which the tissue, spore wall ornamentation, etc. stains bluish-black in Melzer's reagent (iodine solution), showing the presence of starch.

amygdaliform – having an almond-shape, usually referring to almond-shaped spores.

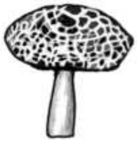
anamorph – an asexual reproductive form of a fungus, cf. teleomorph.

apothecium – a cup-shaped or saucer-shaped fruit-body, typical of some ascomycetes. See *Aleurina ferruginea.*

applanate – flattened or becoming flattened.

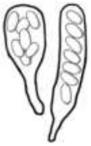
appressed – scales, fibres or hairs that lie flat against the surface of the pileus or stipe.

areolate – a surface that is split into regular or irregular shaped blocks, revealing the underlying flesh, usually referring to the outer skin of a fungus.



ascomycete – a class of fungi that produce their spores in sac-like cells called asci.

ascus (pl. asci) – a microscopic sac or tube which contains the spores of an ascomycete.



biseriate – spores arranged in two rows in the ascus. (See also uniseriate).

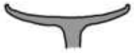
bracket – a fungus with a bracket-shaped fruit-body, often produced on trees or dead wood. The fruit-body can be woody, fleshy, tough, or leathery.

caespitose – where a number of fruit-bodies are fused together. See *Flammulina velutipes.*

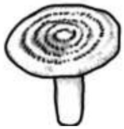
campanulate – (often of pileus) bell-shaped.

chlamydospores – asexual spores formed by the breaking up of fungal hyphae.

clavate – club-shaped.

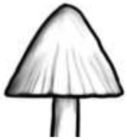


concave – saucer-shaped; often used to describe the shape of disc fungi.

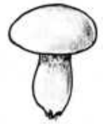


concentric – having rings or zones within each other.

concolorous – two or more objects having the same colour.



conic – cone-shaped (e.g. a pileus that is taller than its width and often pointed).



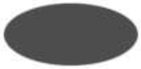
convex – rounded, higher in the middle than at the margin.

coprophilous – growing on dung or droppings.

cylindric – cylinder-shaped, e.g. a stipe that has the same diameter from apex to base.

dextrinoid – a chemical staining reaction in which the tissue, spore wall ornamentation, etc. stains reddish to reddish brown upon exposure to iodine or Melzer's reagent. (See also amyloid).

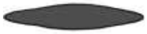
diploid – of a nucleus, cell, hypha, or a fruit-body having two sets of chromosomes (male and female).



ellipsoidal – a object that is bilaterally symmetrical,with curved sides and rounded ends, often referring to the shape of spores.

ephemeral (evanescent) – appearing briefly and then vanishing, e.g. a part of the fungus that is present in the young fruit-body, but disappears when it matures.

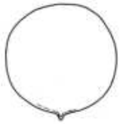
fruit-body – in macro and micro fungi, the structure that supports the spore-bearing organs.



fusiform – spindle-shaped, tapering at both ends (usually referring to spores).

germ pore – thin region of spore wall via which spores can germinate.

glabrous – smooth, without any hairs or other ornamentation.



globose – having a spherical shape (e.g. fungal fruit-bodies or spores).

glutinous – (often describing a pileus surface) covered with a slimy gelatinous layer.

granulose – (often describing a pileus or stipe surface) covered with small granules.

guttule – a small oil-like drop visible (via a microscope) inside a fungal spore.

haploid – of a nucleus, cell, hypha, or a fruit-body having only one set of chromosomes.

hyaline – clear and without colour; referring to structures such as spores seen under a microscope.

hymenium – the spore-bearing surface of the fruit-body.

hypha (pl. hyphae) – one of the filaments of a fungal mycelium.

imbricate – overlapping like roof tiles, e.g. the scales on a pileus, or multiple tiers of a bracket-like fungus. See *Coprinus comatus.*

inamyloid – no change of colour upon application of Melzer's reagent.

inoperculate – said of asci which discharge the spores through an apical pore. (See also operculate).

lignicolous – growing on or in wood.

lubricous – slippery; a greasy smoothness.

macrofungi – fungal fruit-bodies that can be seen readily with the naked eye.

mycelium – the filamentous vegetative (growing and feeding) portion of a fungus.

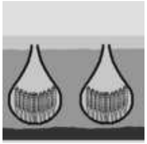
mycorrhizal fungi – fungi that have a symbiotic relationship with a host green plant.

operculate – asci which open apically by a lid (operculum). (See also inoperculate).

ostiole – a pore or hole through which spores are ejected; for an ascomycete at the apex of the perithecium, or for a basidiomycete the mouth of a puffball or earth-star.

parasitic fungi – fungi that feed on other living organisms. See *Cordyceps gunnii.*

perithecium – (pl. perithecia) a small flask-like structure in which the asci are formed, with a narrow ostiole at its apex through which spores can escape. Perithecia are found in some ascomycetes such as *Cordyceps* and *Poronia.*



pulvinate – cushion-like in form.

pyriform – pear-shaped.

resupinate – fruit-body that lies flat on the substrate with its hymenium outermost, often used with reference to crust fungi.

rhizomorph – easily visible string-like aggregation of hyphae, often seen at the base of a fungal fruit-body.

sclerotium – a sterile compact mass of hyphae, usually with a hard outer protective layer.

sessile – a fruit-body without a stipe, so that it sits directly on the substrate.

spatulate – spoon-like in form.

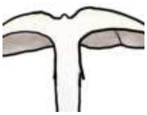
spore – reproductive unit of a fungus.

substratum (substrate) – the material to which a fruitbody is attached.

teleomorph – the sexual reproductive stage of the fungus, producing sexual spores.

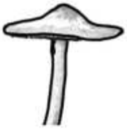
terricolous (terrestrial) – living or growing on soil.

umbilicate – having a deep depression, usually with a small umbo (protrusion) in the centre, e.g. as in a belly button.



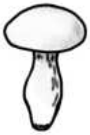
umbo – a broad swelling or bump in the centre of the pileus.

umbonate – a pileus with a distinct swelling or bump (umbo) at the centre.



uniseriate – spores arranged in a single row in the ascus. (See also biseriate).

ventricose – swollen or wider in the middle; (of stipe) swollen at or near the middle; (of lamellae) broader midway between stipe and pileal margin.



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